The Electrical Industry's Weekly Magazine May 22, 1961

Electrical World

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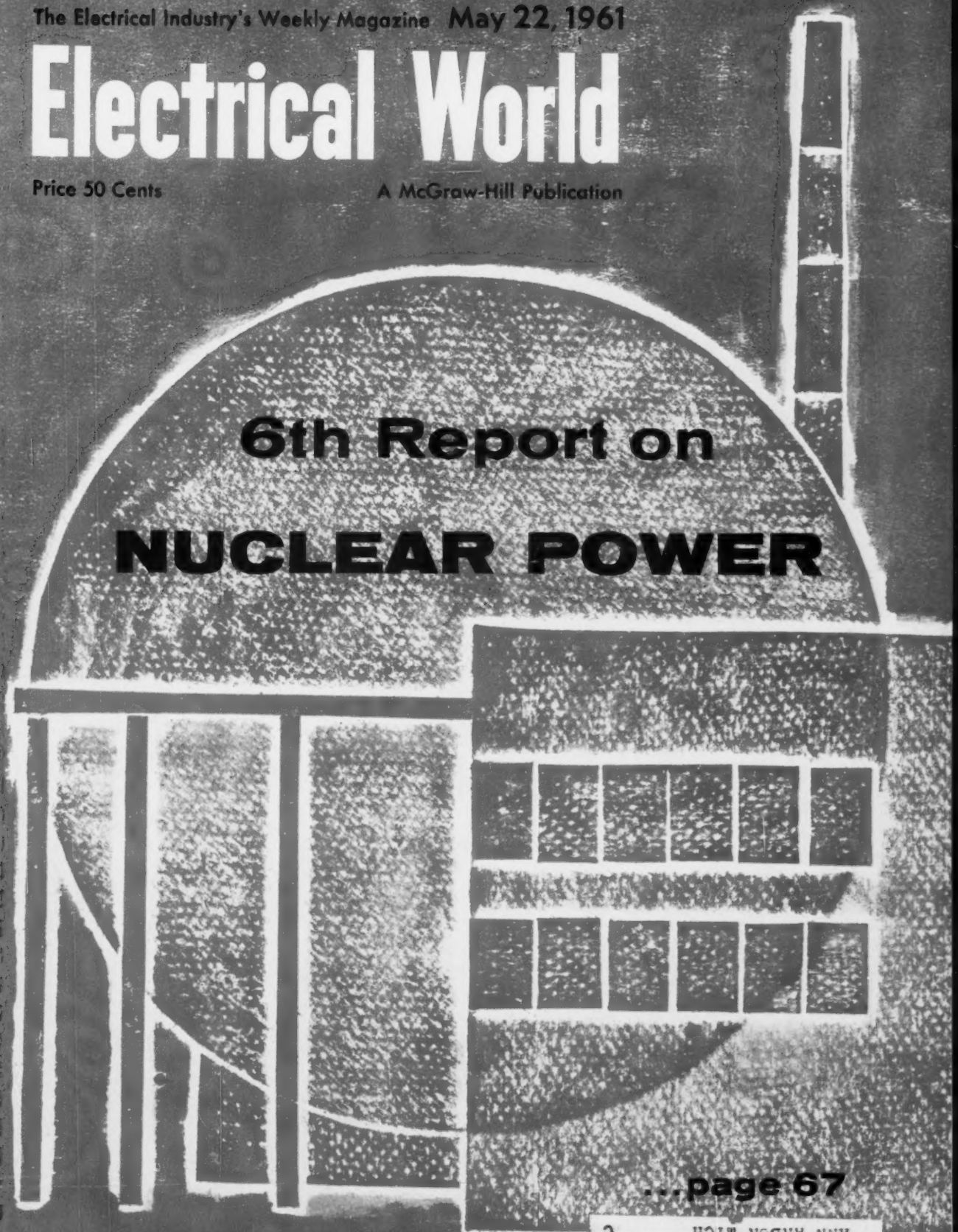

6th Report on NUCLEAR POWER

...page 67

EW Interviews New REA Administrator . . . p 60

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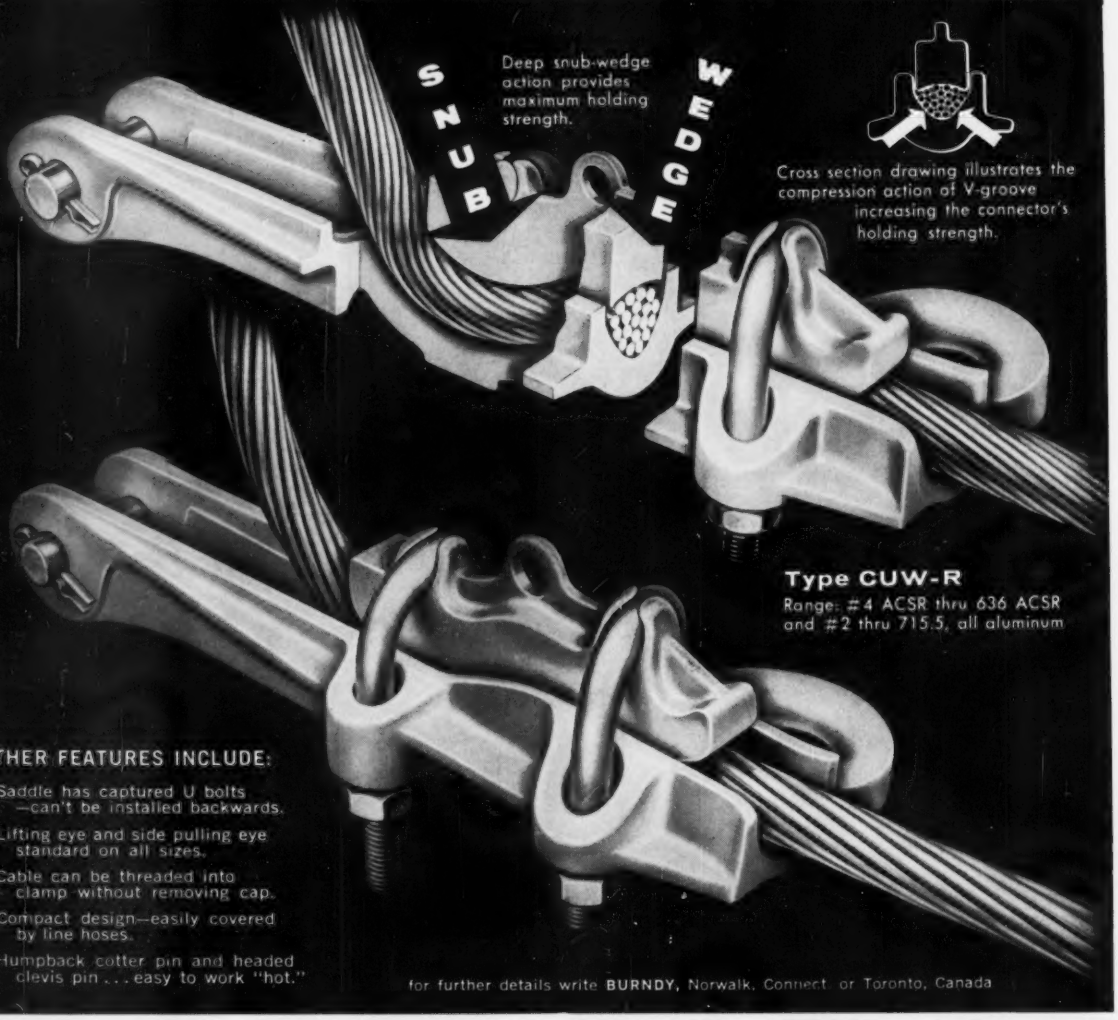
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Published for 87 years for those engaged in the business of generating, transmitting, distributing, or applying electric power

Electrical World

May 22, 1961
Vol. 155, No. 21

Dateline . . .

Depressed Areas Program Builds Up Steam

Washington, D. C.—One of the major domestic programs envisioned by the Kennedy Administration —aid to depressed areas—is now getting under way.

The program, authorized under the Area Revelopment Act, is aimed at what are variously called chronically distressed or depressed areas of the US.

Congress passed the enabling legislation earlier this year, setting up a $394-million package for what President Kennedy called "special help to those areas which have been subjected to chronic unemployment for many months, and in some cases, for many years."

President Kennedy signed the legislation into law May 1. The Commerce Department, charged with administration of the multi-million-dollar program, quickly created a new arm called the Area Redevelopment Administration. Secretary of Commerce Luther H. Hodges tapped William L. Batt Jr, secretary of labor and industry for Pennsylvania, to head the organization.

Although area redevelopment officials have yet to designate the first areas to receive aid, the electric industry is already able to weigh some of the impact of the program.

In essentially urban areas, private companies should benefit from the program without much question. The program is designed to improve the economic status of below-average communities without luring replacement industry from another area and thus creating a different unemployment situation. Congress saw to it that local utilities serving a depressed city, for example, are not to be faced with competition inspired by the program.

Administrators of the program will use five major types of assistance under the redevelopment act. Probably most important are loans for industrial and commercial projects, and loans and grants for public facilities.

Other types of aid available are for technical assistance, occupational training, and some subsistence payments for retraining.

For industrial and commercial loans, $200 million is set aside. The money will be loaned for building new plants, rehabilitating abandoned structures, enlarging others—all with an eye toward attracting business which can employ local workers.

Each project must be supported by a combination

(*Continued on page 5*)

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Which Okonite cable will give you the greatest circuit security?

Your Okonite cable consultant can answer that question. After he has studied your particular application, he'll be able to recommend the right cable construction for you—one that will give you long-lasting, trouble-free service. His recommendations will not be limited by a bias in favor of any particular type of cable, since *only* Okonite furnishes cable with *all* types of insulations.

The photo above is proof of the diversity of the Okonite product. It shows just a few of the many different types of cables produced by Okonite to meet the ever-changing needs of the electrical industry. Some of these cables were tailor-made to solve unusual and, perhaps, never-to-be-duplicated problems. Others are so versatile that they can be adapted to many different situations with no change in basic design. But despite their differences, these cables all have one thing in common—they're the result of Okonite Cable'bility . . . 80 years of experience in providing all types of insulations and coverings.

So, the next time you need help on a cable problem, consult Okonite. You can obtain technical assistance on any problem, large or small, by calling your nearby sales office or by writing: The Okonite Company, Subsidiary of Kennecott Copper Corporation, Passaic, N.J.

***where there's electrical power . . . there's* OKONITE CABLE**

6210

Electrical World

Dateline . . .

Washington, D. C. (*Continued from page* 3)
of public and private participants. In no case can the federal share of an area development project exceeds 65%.

The initiative for a project will be up to the local community or area, once the government designates it for redevelopment. With state approval of a locally drawn economic development program, Washington will consider definite projects under the general plan.

One of the first nibbles that the government received—even before any areas have been designated—was from a major construction company proposing erection of a steel plant in a high-unemployment area. Such a project, for example, would benefit local utilities both directly and indirectly by establishing an additional market and spurring local economic conditions.

The idea of area development, of course, is generally accepted by investor-owned utilities. The concept is similar to programs long pushed by local utilities to gain new business and industry for their communities, by state promotion groups, and others.

In rural areas, however, a controversy is already arising. Investor-owned companies are fearful that funds allocated under the program for rural development will be dispensed by the Rural Electrification Administration and conceivably in a manner which might adversely affect the interests of investor-owned companies as opposed to cooperatives. (See page 60.)

Meanwhile, the National Rural Electric Cooperative Assn is working to bring non-farm economic activity to rural areas. Some government officials see this as a general trend and say any stimulation of rural areas will be a result of this trend, rather than any deliberate effort by program administrators to steer development money toward rural areas and cooperatives.

Letters

Article Repays the Effort

To the Editor:

I have just received the May 8 issue of *Electrical World* and want to let you know what a fine job I think has been done in presenting our project ("Taum Sauk Will Provide 350 Mw of Peaking Hydro").

It was a good deal of work for some of us, but I believe the results amply repay this effort.

George P. Gamble
Executive Vice President, Operations
Union Electric Co

Wants Listing of Electric Utilities

To the Editor:

We are in the process of compiling an up-to-date list of all electric utilities in the country. This list, of course, is of major importance to anybody selling electrical products.

It may be that through your organization you already have such a list compiled showing executive personnel of each of the companies. If you do have such a list, could this be made available to us?

Name withheld

► The above letter is a sample of scores of such letters we receive each year asking the same question. The only complete listing of electric utilities, top personnel, and individual company statistics that we know of is the Directory of Electric Utilities which is published annually by McGraw-Hill. The next edition will be available in August. Further information can be obtained by writing Directory of Electric Utilities, 330 W 42nd St, New York 36, N. Y.

Now It's Power Bills—Not Light Bills

► A recent communique from Detroit Edison Co tells us:

"Folks don't pay light bills any more. . . .

"A survey conducted by Detroit Edison and 21 other utilities, from coast to coast, shows that the average use per house for lighting was a mere 21.8% of the total electrical usage. The remainder of the kwhrs are used for radio, television, heating, appliances and other electrical accessories."

ELECTRICAL WORLD
Vol. 155, No. 21 May 22, 1961

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Now Available...

USS QUENCHED AND TEMPERED STRUCTURAL SHAPES

in such grades as "T-1", "T-1" type A, 9% Nickel and HY-80 Constructional Alloy and Armor Steels

Announcing another industry "first" for United States Steel—USS Quenched and Tempered Alloy and Armor Steel Structural Shapes are now commercially available for the first time anywhere, in the types and sizes shown in the accompanying tables. The more commonly used sizes of American Standard Beams, Channels, Equal Angles and Unequal Angles will be produced in these USS Steels: "T-1", "T-1" type A, 9% Nickel, HY-80 and certain other alloy grades that provide desirable mechanical properties after quenching and tempering. Later, other sizes and shapes will be added according to demand.

These quenched and tempered alloy and armor steel structural shapes (see table below) can simplify design and result in substantial weight savings, increased structural strength and reduced shipping and handling costs. For a free folder about any of these steels or their structural shapes, contact your local USS representative or write to United States Steel, Room 6309, 525 William Penn Place, Pittsburgh 30, Pa. USS and "T-1" are registered trademarks

United States Steel Corporation • Columbia-Geneva Steel Division • Tennessee Coal & Iron Division • United States Steel Supply Division • United States Steel Export Company

Availability Quenched and Tempered standard structural shapes are available in the following shapes and sizes:

I	Beams: 6″ to 12″ inclusive	American Standard Sections and Foot Weights*
[	Channels: 6″ to 15″ inclusive	American Standard Sections and Foot Weights*
L	Equal Angles: 3″ to 8″ inclusive	Standard Sections*
L	Unequal Angles: 3½″ x 3″ to 8″ x 6″ inclusive Maximum Length 40′ for all sections	Standard Sections*

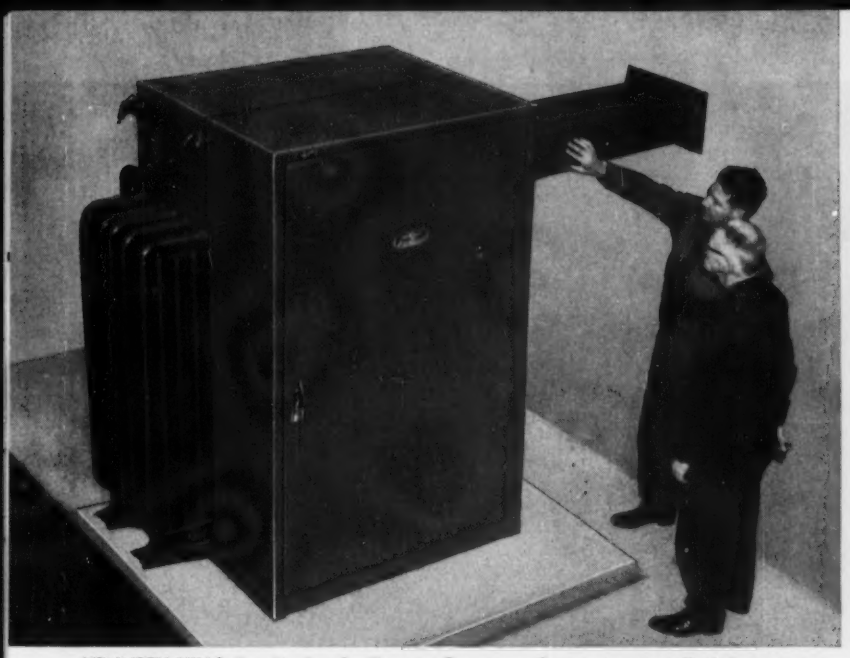
*See our booklet, "USS Shapes & Plates," ADUCO-27001

Mechanical Properties of Quenched and Tempered Alloy and Armor Steel Structural Shapes

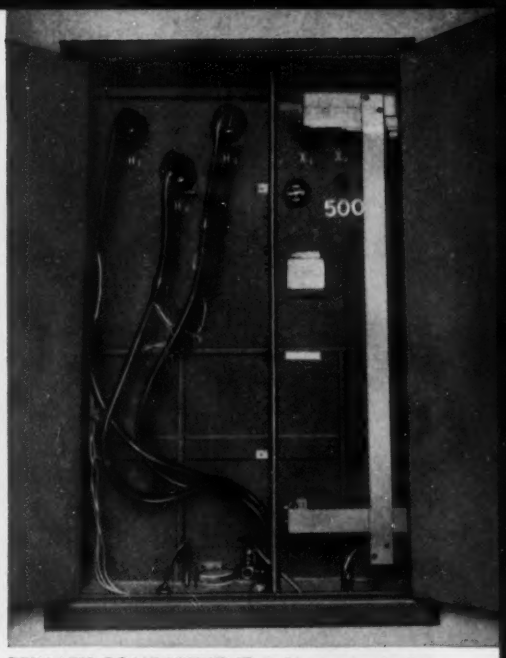
	Yield Strength, psi	Tensile Strength, psi	Elong. in 2″, % min.	Reduction of Area, % min.	Longitudinal Charpy Impact (when specified)	
					Keyhole	V-notch
"T-1" Steel 2½″ and Under	100,000 (min.)	115,000/140,000	18	55①	15 ft.-lbs. @ −50F	30 ft.-lbs. @ +10F
"T-1" type A 1″ and Under	100,000 (min.)	115,000/140,000	18②	45②	15 ft.-lbs. @ −50F	—
Grade A 9% Nickel	60,000 min.	90,000 min.	22% min.	—	15 ft.-lbs. @ −320F	20 ft.-lbs. @ −320F
Grade B 9% Nickel	65,000 min.	95,000 min.	20% min.			
HY-80 ¼″-2″ Incl.	80,000/100,000③	—	19④	—	—	70 ft.-lbs. @ −120F

①¾″ and under—45% min.
③½″ and over, yield strength range is 80/95,000 psi
②¾″ to 1″ inclusive, elongation 16% min.
④½″ to 2″ inclusive, elongation 20% min.
②¾″ to 1″ inclusive, 55% min.

USS United States Steel



KENNETH HILLS (back), Pacific Electric Company, Bremerton, installed the unique bus and duct, which he is showing to L. E. Hill, Asst. Supt., Western Division, Puget Sound Power & Light Company. The power company installed the L-M Pad-Mount transformer. Coast Electric & Manufacturing Co. made the bus and duct.



PRIMARY COMPARTMENT (left) can be locked and still permit access to secondary compartment, right. Short 4-foot bus connected to switch panel cuts secondary voltage drop.

NEW WESTBAY SHOPPING CENTER, Port Orchard, Washington. Power service is led underground to the Pad-Mount transformer from the pole at the right, which carries fuse cutouts and lightning arresters. Alexander H. Hargis designed the underground system and engineered the entire shopping center.

L-M's Pad-Mount® Transformer Maintains Voltage For West Coast Shopping Center

Unique design provides short 4-foot bus to switch panel, maintenance-free duct connection at Port Orchard, Washington shopping center.

Secondary voltage drop in incoming service is reduced by unique bus design in the L-M Pad-Mount transformer installation at Westbay Shopping Center, Port Orchard, Wash.

Separate primary and secondary cabinets in the Pad-Mount transformer simplify installation and provide flexibility for future transformer changes. Tamper-proof construction with no accessibility to live parts assures maximum safety for shoppers and children. The compact design and neat appearance make the transformer unobtrusive.

Installation Data

Primary

Type of circuit.....radial
Pad-Mount transformer rating, 12470Y/7200 volts, 500 kva

Secondary

Type of circuit.....four-wire
Voltage, volts.....208Y/120
Type of load.....commercial

OUR 50TH YEAR LM 1911 – 1961

LINE MATERIAL® Industries

McGRAW-EDISON COMPANY

503

Transformers

McGRAW EDISON

DISTRIBUTION TRANSFORMERS • RECLOSERS, SECTIONALIZERS AND OIL SWITCHES • FUSE CUTOUTS AND FUSE LINKS • LIGHTNING ARRESTERS • POWER SWITCHING EQUIPMENT
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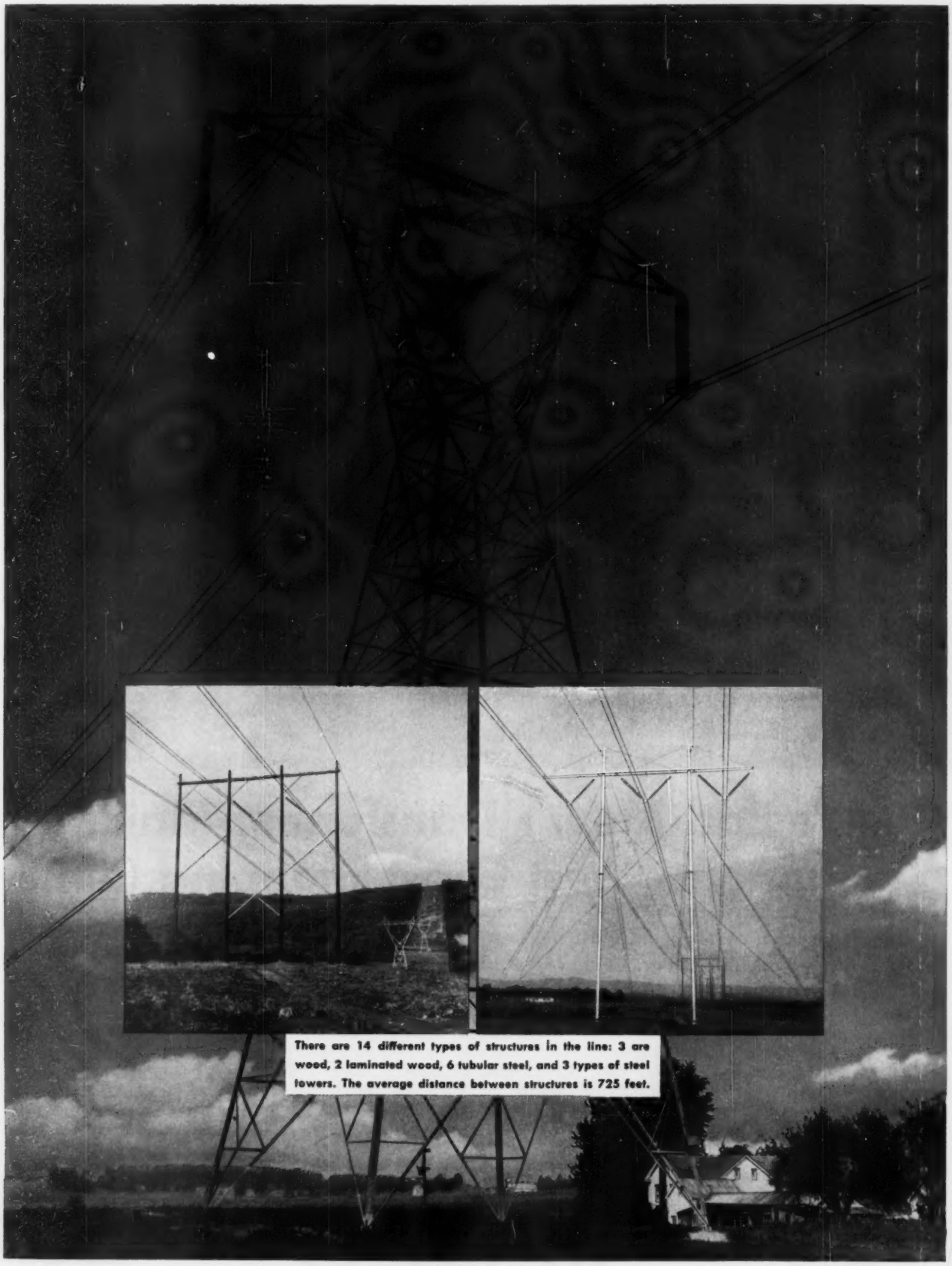


There are 14 different types of structures in the line: 3 are wood, 2 laminated wood, 6 tubular steel, and 3 types of steel towers. The average distance between structures is 725 feet.

AMERICA'S "BIG-VOLT" LINE protected by ALUMOWELD OVERHEAD GROUND WIRE

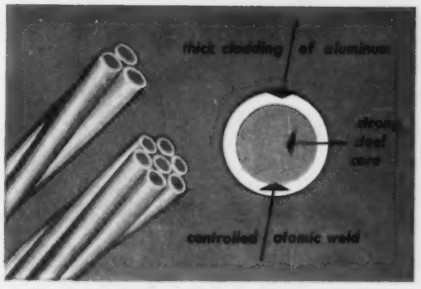
Like the famed "Big Inch" in the oil industry, Pennsylvania Electric Company's "Big Volt," its new 460-KV transmission line, represents a bold step forward in supplying the growing energy needs of America.

To protect the highest voltage operational line in America from lightning and transient currents, Penelec is using Alumoweld Overhead Ground Wire. This dependable, low-cost shield wire has three times the electrical conductance of steel, is just as strong and weighs 18% less. It has the same long life as solid aluminum.

Alumoweld is the result of the first successful cladding of a *thick* layer of pure aluminum over a high-strength steel core. The concentric aluminum covering comprises 25% of the cross-sectional area of each wire. Its high strength-to-weight ratio—higher than any other overhead ground wire—permits stringing with greater mid-span clearance to provide maximum lightning protection. Alumoweld's excellent conductivity assures reliable operation of protective relays and effectively discharges transient currents to ground.

Order Alumoweld Overhead Ground Wire and get Low-Cost, Long-Life Protection for your transmission lines.

For more complete Alumoweld data send for Engineering Bulletin E.D. 3000.



A seven-strand Alumoweld Overhead Ground Wire (7 No. 6 Awg wires), approximately ½-inch in diameter with a breaking strength of over 22,700 pounds, is used to protect the highest voltage transmission line in America.

ALUMOWELD®

COPPERWELD STEEL COMPANY

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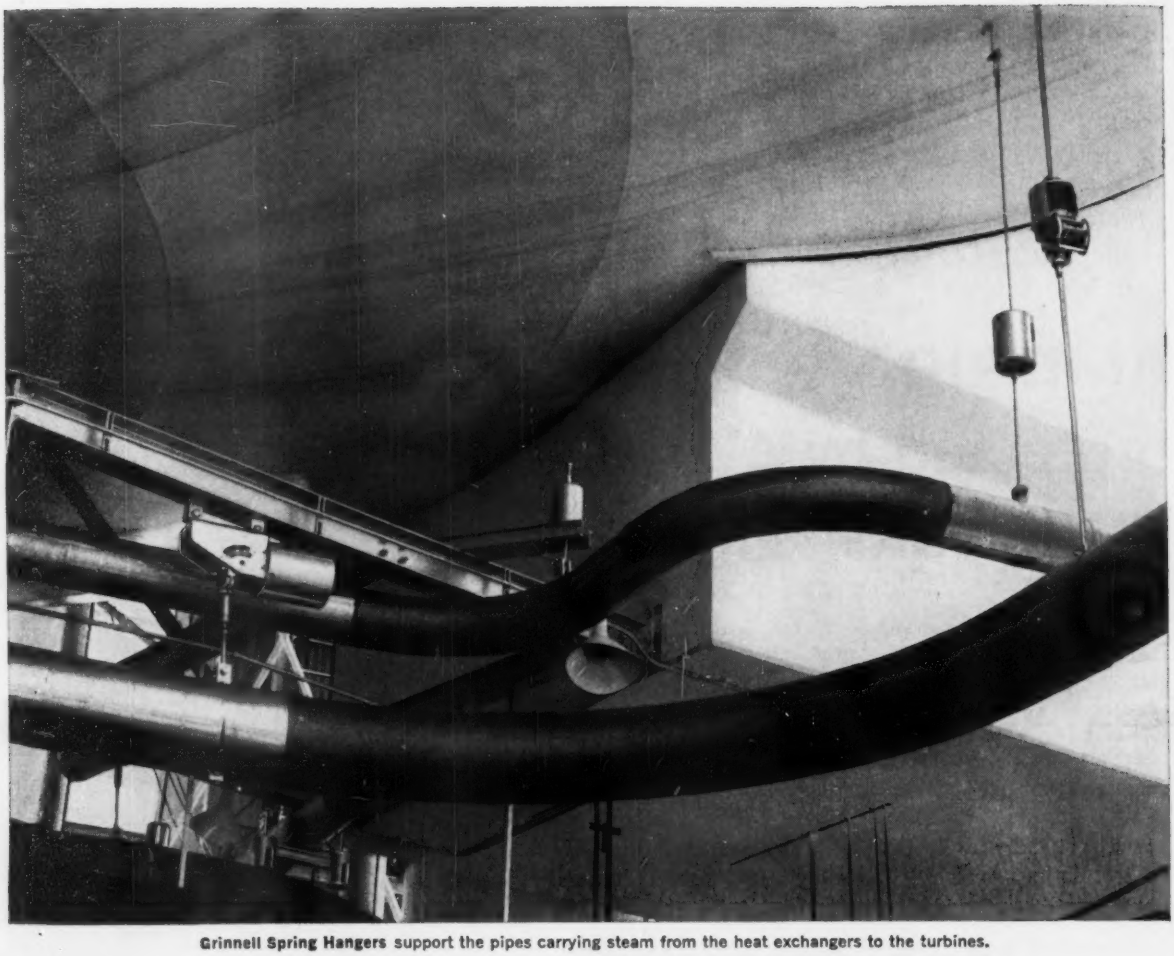


Grinnell Spring Hangers support the pipes carrying steam from the heat exchangers to the turbines.

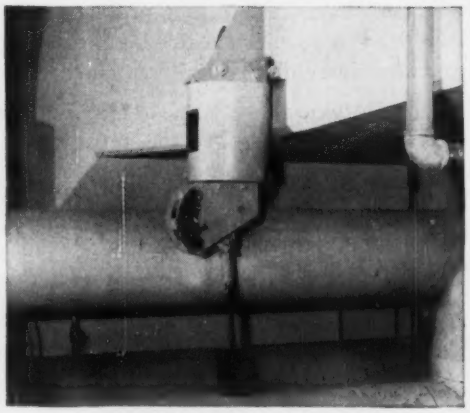
Grinnell Hangers cradle high-pressure piping at new Yankee Atomic Power Plant

At the new Yankee Atomic Power Plant in Rowe, Mass., uranium fuel in the nuclear reactor keeps the water which flows through the reactor at about 500°F. This pressurized water, at 2,000 pounds per square inch pressure, transfers the heat through piping to a steam generator where steam is produced for running power turbines.

Piping that undergoes such high pressures and temperatures must have rugged, *reliable* support. Chosen for this tough job: Grinnell Pipe Hangers!

Grinnell Constant Support Hangers are used where reactive forces at terminal points must be kept within specified limits. Grinnell Variable Spring Hangers are used where piping is subject to vertical movement and does not require a constant support type.

For a complete line of engineered pipe hangers and supports . . . for skilled advice and assistance . . . for experienced field engineering service . . . call on Grinnell Company, Providence 1, Rhode Island.



Turbine extraction lead gets support from Grinnell Constant Support Hanger

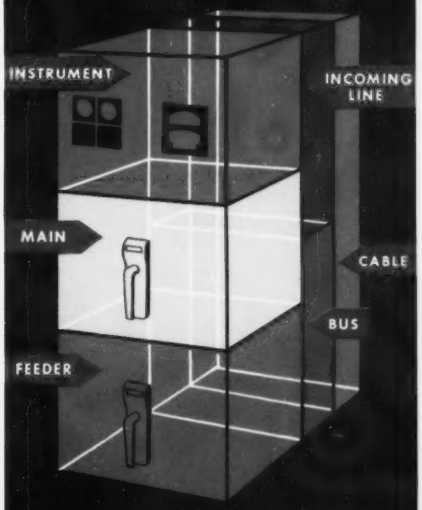
GRINNELL AMERICA'S #1 SUPPLIER OF PIPE HANGERS AND SUPPORTS

Pipe Fittings, Valves, Pipe Hangers, Prefabricated Piping, Unit Heaters and Piping Specialties • Branch Warehouses and Distributors from Coast to Coast

SWITCHGEAR
AS NEW INSIDE
AS IT IS OUT

INTRODUCING . . .

New Powermaster Type AKD-5 Low Voltage Switchgear



Phantom view illustrates significant advances in compartmentation achieved in Powermaster Switchgear.

Highlighted by a new concept in appearance design, General Electric's new Powermaster Type AKD-5 Switchgear reflects the needs of today's modern power systems for increased safety, added convenience and . . .

GREATER RELIABILITY

For the highest degree of service continuity, compartmentation and isolation of the key functional components in the equipment:

Minimize fault hazard—separate bus compartment prevents the entry of foreign objects such as tools, rodents, fish tapes, etc.—the major cause of bus faults.

Minimize fault communication—isolated incoming line compartment reduces hazard of fault transfer from the main bus to incoming line—thus permitting more effective operation of the main breaker on any possible bus fault.

Reduce maintenance requirements—Welded bus provides positive joints with a high degree of electrical conductivity—minimizes periodic tightening of bus bolts. New bus configuration and enclosure reduces dust contamination—minimizes cleaning requirements.

Call your General Electric sales engineer or send for publication GED-4269. *General Electric Co., Schenectady, N. Y.*

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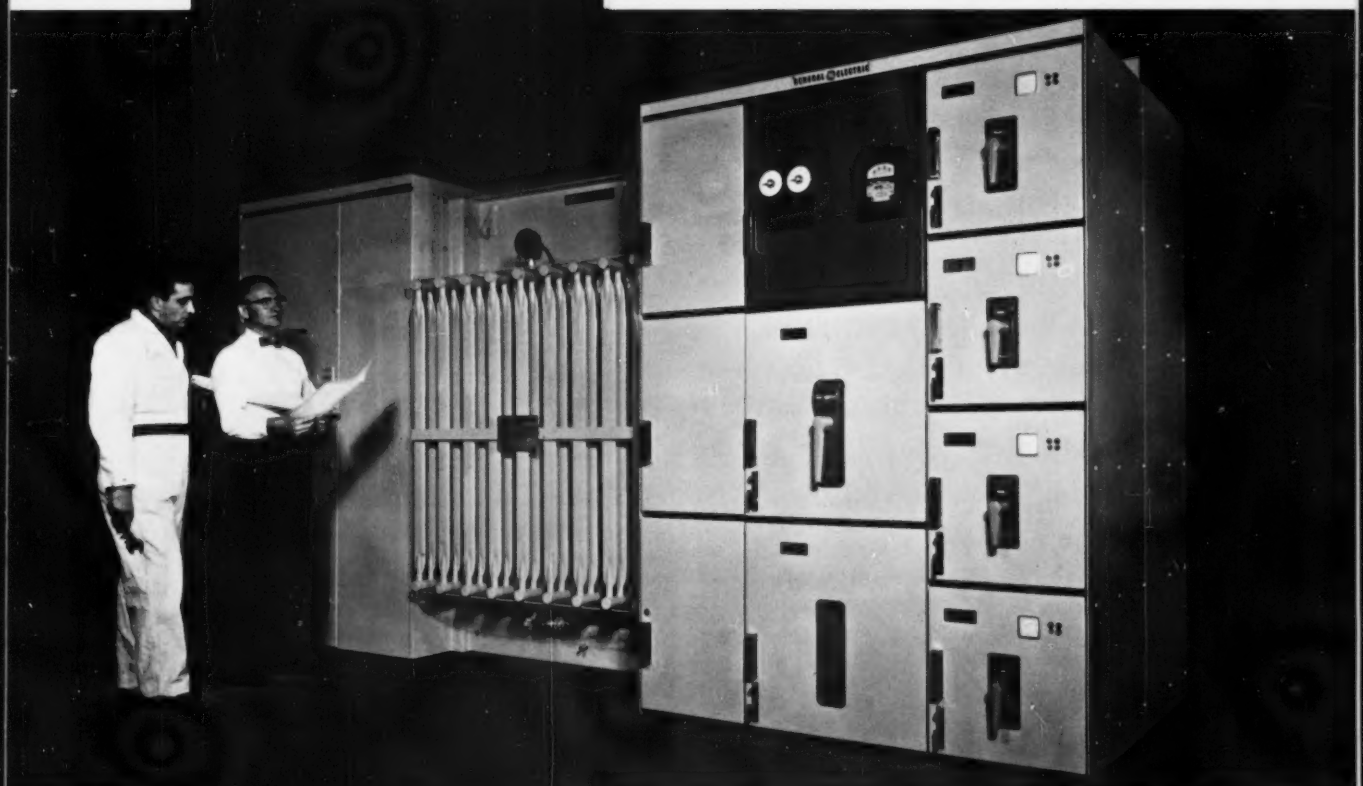


1000 KVA Load Center Unit Substation with Powermaster Type AKD-5 Switchgear. Colorful blue panels accent over-all appearance design.

GENERAL ELECTRIC

Strongest of All!

Only CRESTOGRIP has this double strength BOX JOINT. All others have conventional lap joint.

Grips Anything!

Flat, square, round or hex. objects. Adjustable to 4 positions up to 1½" capacity.

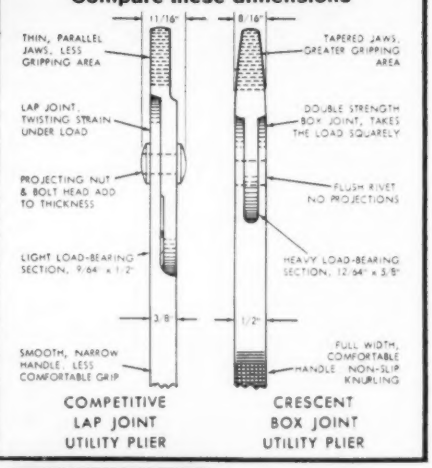
NO OTHER UTILITY PLIER LIKE CRESTOGRIP®

Easy to Adjust!

Simply "walk" the rivet recess over the bearing point (shown in cut-a-way view) with a pumping action of handles.

World's Thinnest!

Compare these dimensions

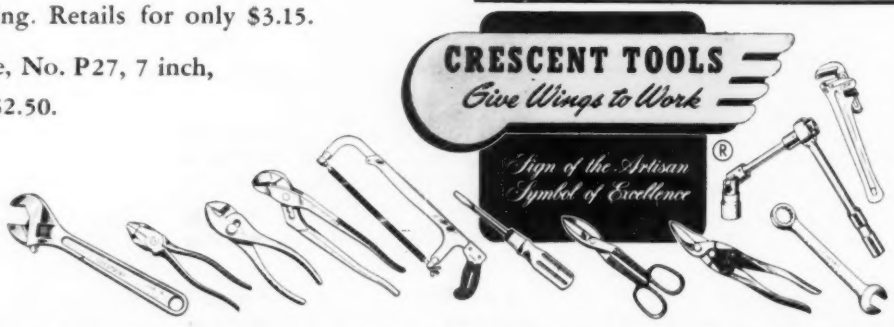

11/16"
8/16"
THIN, PARALLEL JAWS, LESS GRIPPING AREA
TAPERED JAWS, GREATER GRIPPING AREA
LAP JOINT, TWISTING STRAIN UNDER LOAD
DOUBLE STRENGTH BOX JOINT, TAKES THE LOAD SQUARELY
PROJECTING NUT & BOLT HEAD ADD TO THICKNESS
FLUSH RIVET, NO PROJECTIONS
LIGHT LOAD-BEARING SECTION, 9/64" x 1/2"
HEAVY LOAD-BEARING SECTION, 12/64" x 5/8"
3/8"
1/2"
SMOOTH, NARROW HANDLE, LESS COMFORTABLE GRIP
FULL WIDTH, COMFORTABLE HANDLE, NON-SLIP KNURLING
COMPETITIVE LAP JOINT UTILITY PLIER
CRESCENT BOX JOINT UTILITY PLIER

Crescent's No. P210 CRESTOGRIP is a utility plier absolutely without equal. It's distinctive features, illustrated on this page tell why. Exhaustive tests against competitive tools prove CRESTOGRIP to be stronger, thinner in overall dimensions, and capable of greater gripping power.

This versatile tool measures 9½" overall, weighs a mere 12 ounces, yet gets in and grips where no other tool will do the job. Finished in rust resistant zinc plating. Retails for only $3.15.

New smaller size, No. P27, 7 inch, retails for only $2.50.

CRESCENT TOOLS
Give Wings to Work
Sign of the Artisan Symbol of Excellence ®



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CRESCENT TOOL COMPANY, JAMESTOWN, NEW YORK

Electrical World

MAY 22, 1961
Vol. 155, No. 21

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NEXT WEEK

PHILIP SPORN REPORTS there are few surprises in Soviet plans for large steam units.

The Electrical Week

LATE NEWS ▶ **Key utility purchasing executives foresee gradually firming prices** on heavy electrical equipment. Observers at the annual EEI Purchasing & Stores Committee meeting in Houston hear reports of a "bottoming out" and even a slight upturn in equipment prices. One knowledgeable utility purchasing agent predicts prices inching up in the next three months on heavier equipment, although there may be some retreat in prices on lighter pole-line hardware.

Southeast England goes dark for periods of up to three hours on May 15 during an unprecedented failure affecting most of London, Kent, Sussex and Surrey. Central Electricity Generating Board statement attributes outage to trouble on the 132-kv system causing cascaded circuit tripping. The 275-kv grid is not affected. Power restoration is handicapped by limited capacity of grid lines.

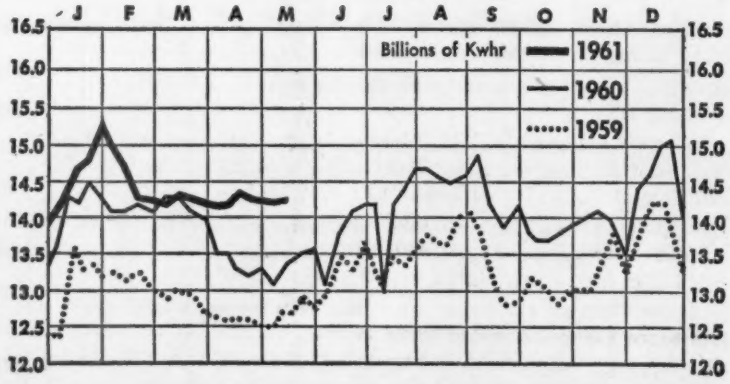
New power pool of 7,000-Mw capacity, called Southeast New York Interconnection, embraces Consolidated Edison, Long Island Lighting, Central Hudson G&E, and Orange & Rockland Utilities. New pool is part of 36,000-Mw Canadian-US-Eastern Interconnection. Details were described at EEI Electrical System and Equipment Committee meeting in New York last week.

A "do something" attitude is shown by the 800 delegates attending the Rural Area Development Conference in Washington. Sen Paul Douglas (D-Ill.) and Agriculture Secretary Orville Freeman explain REA's key role in administering the area development bill. Co-op leaders are anxious to succeed in a new opportunity to participate in what they consider a broad, important national economic activity.

Authorization of the proposed 500-kv Bonneville-California intertie will probably be delayed at least until the end of the year. Interior Secretary Stewart Udall's five-man task force studying the line has received six more months—until Nov. 1—before it must submit its report on the line's feasibility. Originally Udall had asked for a report from the task force, headed by Bonneville Administrator Charles Luce, by May 1.

Weekly power output shows continued increase, indicating that industrial consumption may be up, as seasonal swing to higher temperatures is delayed in most of the country.

***WEEKLY POWER OUTPUT*—Up 4.1%** (Week ending May 13), Kwhr 14,278,000,000



Percent Change From Previous Year

	Apr. 29	May 6	May 13
Total U. S.	+ 4.4	+ 5.3	+ 4.1
New Eng.	+ 7.8	+ 7.4	+ 6.4
Mid. Atlan. ...	+ 4.5	+ 5.5	+ 4.9
Cent. Indust...	+ 0.8	+ 1.7	− 0.7
West Cent. ...	+ 4.6	+ 4.5	+ 5.2
Southeast	+ 3.4	+ 4.7	+ 2.4
South Cent. ...	+ 8.3	+11.4	+12.8
Rocky Mount...	+ 5.1	+ 8.0	+10.5
Pacific			
NW	+ 4.5	+ 3.7	+ 7.0
SW	+11.8	+11.5	+ 6.9

Seasonally Adjusted Index 290

Week Ago 290 Year Ago 278

Source: Edison Electric Institute

Supply Lines

SUBPOENA SECRECY UPHELD; PRICING PROBLEM RELATED; NEW DAMAGE SUITS

Various ramifications of the manufacturers' antitrust problems remained in the news this past week. In Philadelphia, a federal judge decided that grand jury subpoenas used in the investigations of the antitrust cases should remain secret. In Phoenix, Los Angeles, and Seattle more damage suits were filed. And in Washington, the Senate Antitrust and Monopoly Subcommittee, continuing its probe of the electrical manufacturing industry, heard about the pricing problems of a medium-sized switchgear manufacturer. GE Chairman Ralph Cordiner and Westinghouse President Mark Cresap were scheduled to testify late last week.

Federal District Judge J. Cullen Ganey ruled in favor of the manufacturers May 11 when he denied prospective damage seekers access to subpoenas issued by the Philadelphia grand juries that returned 20 antitrust indictments against the manufacturers. These subpoenas detailed the list of witnesses appearing before the grand juries and the documents the companies furnished. Unsuccessfully arguing in favor of access to the subpoenas were state governments, municipalities, investor-owned utilities, and other groups (EW, April 3, p 13).

In his ruling, Judge Ganey upheld the "traditional rule of secrecy surrounding grand jury proceedings" and stated that the "avoidance of expense and additional work, in order to recoup alleged financial losses in the various civil actions for treble damages . . . do not out weigh the policy of secrecy."

In Washington, the Kefauver Subcommittee heard Max Scott, president of I-T-E Circuit Breaker Co, explain why he could still see future problems in pricing in the electrical industry. "Certain companies, usually the largest," he said, "may assume the position that they will publish price lists, and if prices are not followed by all other companies issuing price sheets, they will take prices right down to the cellar and work back." This sort of pricing, Scott said, could result in a worse situation than what the government uncovered in Philadelphia. Although he didn't say so, Scott appeared to be referring to certain GE departments whose announced price policies are to keep published prices right in step with market prices.

Referring to catalog prices, Scott said that up to the time of the indictments, these were set in the switchgear industry by companies getting together at meetings. But he added that although it is more difficult to accomplish, the same result occurs when published price lists are circulated among competitors. Right now, though, this has stopped, Scott explained, and I-T-E, for one, is in the process of independently determining its price lists. In addition, Scott said, "In our company I have ordered that price identity be avoided, even by accident." He says he has ordered his sales force on sealed-bid business to "take odd dollars off or put odd dollars on to reduce the mathematical possibility of hitting identical prices."

In explaining I-T-E's participation in price-fixing meetings, Scott said that at the time, "I did not think it was good for our company. I just didn't like it," he said. "Perhaps your next question would be, 'Why did you become involved?' but circumstances at the time presented to us a record of such overwhelming compulsion that there was just no way out." Scott said he felt "relieved" when the Philadelphia investigations began and asserted that he had been attempting to extricate I-T-E from the meetings.

Senators heard last week that representatives of General Electric, Westinghouse Electric Corp and Allis-Chalmers Mfg had pondered whether they should lower turbine prices to meet levels by foreign manufacturers at a meeting sometime in

1958. An A-C official gave this testimony to members of the Senate Antitrust & Monopoly Subcommittee.

J. W. McMullen, who retired May 1 as vice president and general manager of A-C's power equipment division, recalled that GE and Westinghouse officials felt price levels should not be dropped to meet foreign competition, "but I felt they should."

But as it turned out, said McMullen, the other two companies did reduce their prices and A-C did not. The discussion related to a turbine-generator for the Power Authority of the State of New York. McMullen said he could not recall who finally did get the job.

Frank Roby, executive vice president of Federal Pacific Electric Co, told the subcommittee that after indictments had been handed down, he had contacted Max Scott, president of I-T-E Circuit Breaker Co, to find out if Scott's company would be interested in acquiring a "part of our heavy industry business." Roby did not identify what FPE had for sale, although he said it was losing money for Federal Pacific and he said he knew of "Scott's interest" in heavy equipment. "I wanted to see if he would purchase it on what I considered a favorable basis," Roby said.

After three meetings, Scott said I-T-E was not interested, Roby said. It was at one of these sessions, according to Scott, that Roby said Arthur F. Vinson, executive vice president of GE, was "involved" in price-fixing talks.

"I'm afraid Mr Scott is guilty of reporting quite inaccurately about that conversation," Roby said. He denied he mentioned Vinson's name, and said that "possibly because Mr Scott is a little hard of hearing he was confused."

On the damage suit front, three more were filed this past week. In Los Angeles, the Department of Water and Power is asking for triple damages of $3,234,000 from five circuit breaker manufacturers. In Seattle, the Chelan County PUD of Wenatchee is asking for $15 million in triple damages from six electrical manufacturers. And in Phoenix, the Salt River Project has filed a second suit, this time for $754,170 in triple damages from three meter manufacturers. The agency says the suits are being filed to protect its legal position, and that negotiated settlements "are currently in progress with heads of defendant companies."

Finally, in Philadelphia again, there appear to be two distinct phases in the grand jury investigation arising out of the supposedly-settled 20 indictments. One phase is the investigation into the liability-sharing agreement involving the "big 3" and Ingersoll-Rand Co. Records subpoenaed from GE have yet to be turned over to the jury, pending a decision from the judge on their further use (EW, May 15, p 17). The other phase is apparently a further probe into the involvement of top GE executives in the antitrust conspiracies. Reports from Washington have it that several GE executives who were convicted in the cases recently testified before the grand jury. Earlier, Sen Kefauver had urged the probe because of conflicting testimony before his subcommittee.

COPPER PRICE RAISED AGAIN, THIS TIME TO 31¢/LB.

A further 1¢ boost in the price of copper, to 31¢/lb, was announced May 15 by Anaconda Co. Other producers and custom smelters were expected quickly to follow suit. Two weeks earlier, the price had gone from 29 to 30¢/lb.

Smogtypes need corrosion protection most!

Contaminated atmospheres are the "normal habitat" of Smogtype insulators.

It's an unhealthy environment. In areas of extremely severe contamination, even Smogtypes -- conventional Smogtypes, that is -- may not have what it takes to survive.

For a conventional Smogtype's only defense against the highly corrosive effects of contaminated atmospheres is the extra leakage distance afforded by longer porcelain petticoats. And sometimes, as the accompanying picture shows, extra leakage distance is not enough.

The Smogtype shown in the above illustration accomplished its intended purpose of protecting a 69-kv line from flashover (for a time), but it couldn't protect itself from the corrosive attacks on the pin which eventually destroyed it.

If you have to pay the 50% premium for Smogtypes in order to protect your lines from severe contamination, doesn't it make good sense to protect the *insulators themselves* from the corrosive effects of that contamination?

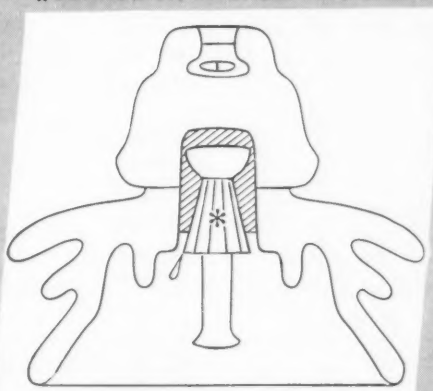
If contamination or corrosion is your problem, then Futura is -- or should be -- your insulator.

Why not talk it over with your O-B representative?

OHIO BRASS COMPANY, MANSFIELD, OHIO

extra leakage distance is no substitute for protection of C. I. S.*

***CORROSION INTERCEPTING SLEEVE**



Futura Smogtype With C.I.S.*

Futura's Corrosion Intercepting Sleeve (C.I.S.) protects against corrosion in two ways. Corrosion products normally deposited on the pin above the cement line, form instead on the yieldable metal sleeve, which gives slightly to eliminate bursting forces on the porcelain. Sleeve also tends to act as a drip shield, diverting moisture (and the corrosive salts dissolved in it) from their customary destructive path down the pin shank.

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In the selection of suspension assemblies, therefore, the need is for *experience* rather than *experimentation.*

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The reasons are twofold:

1) the fact that O-B has the extensive laboratory facilities required to duplicate "in our own backyard" the most rigorous service requirements ever contemplated by our customers;

2) the fact that O-B insulator assemblies have a proved history of experience behind them - - our experience in making them - - customer experience in using them - - 50 years of experience with well over 50 million units!

When you need answers - - *before* you throw the switch - - why not come to O-B?

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Ohio Brass

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O-B experience in extra high voltage provided answers for Penelec 460 kv line

70% MORE WORKING RANGE with

Holan's Unlimited* Action HD-50 Elbow

Holan's unlimited* action Elbow will go straight up . . . or straight out . . . or 13 feet below street level. It has 70% more working range than limited action aerial arms . . . and will put your linemen in a greater variety of working positions than any other aerial arm on the market today.

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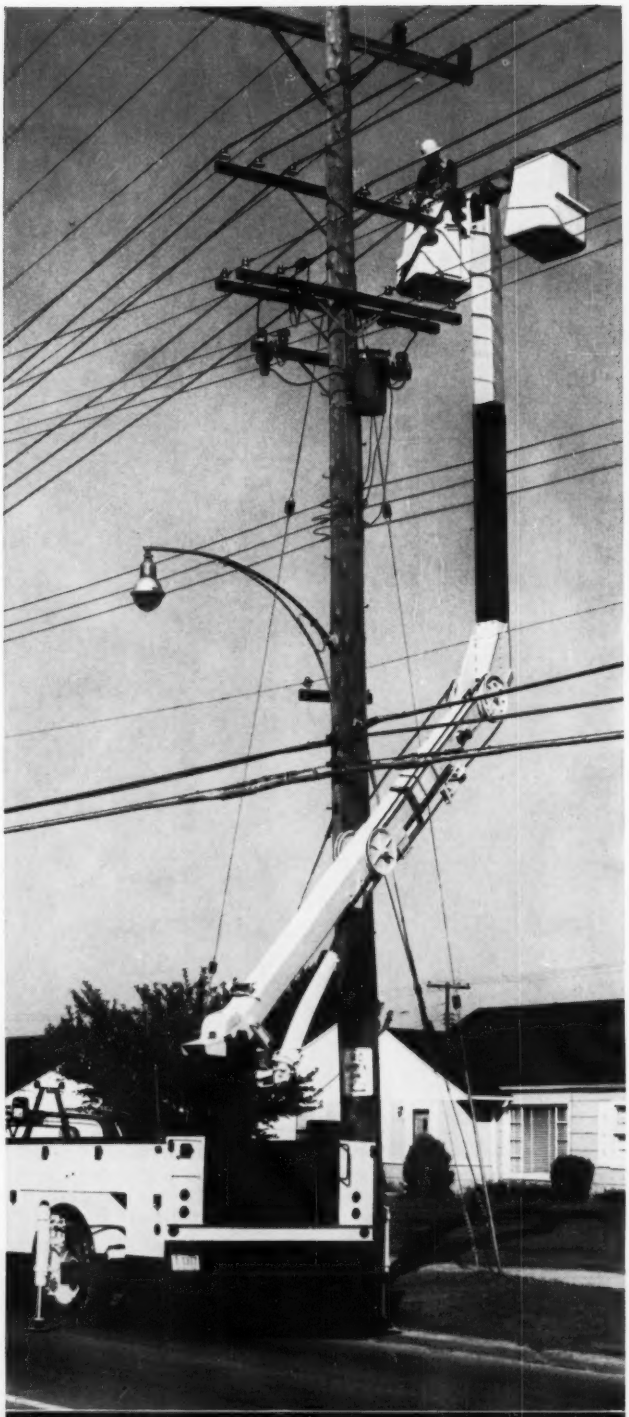
Safety demands rigidity . . . precise control of the upper arm . . . and fiberglass buckets certified tested at 50,000 volts (A.C.). The upper arm of the Holan Elbow will withstand a one-minute, 200,000-volt (A.C.) dry bucket-to-ground test.

If you require less than full action, see our medium duty or light duty limited action Elbows and our new 65-foot model. And for the very latest in Holan aerial equipment, be sure to ask about the new Holan "Squirt Boom."

270° UPPER ARM AND 120° LOWER ARM TRAVEL



Parked at the curb, a limited action, two-man bucket aerial arm could not possibly get in this working position. An unlimited* action Elbow goes under the low-hanging communication cables, then up the property side of the pole without moving the truck.

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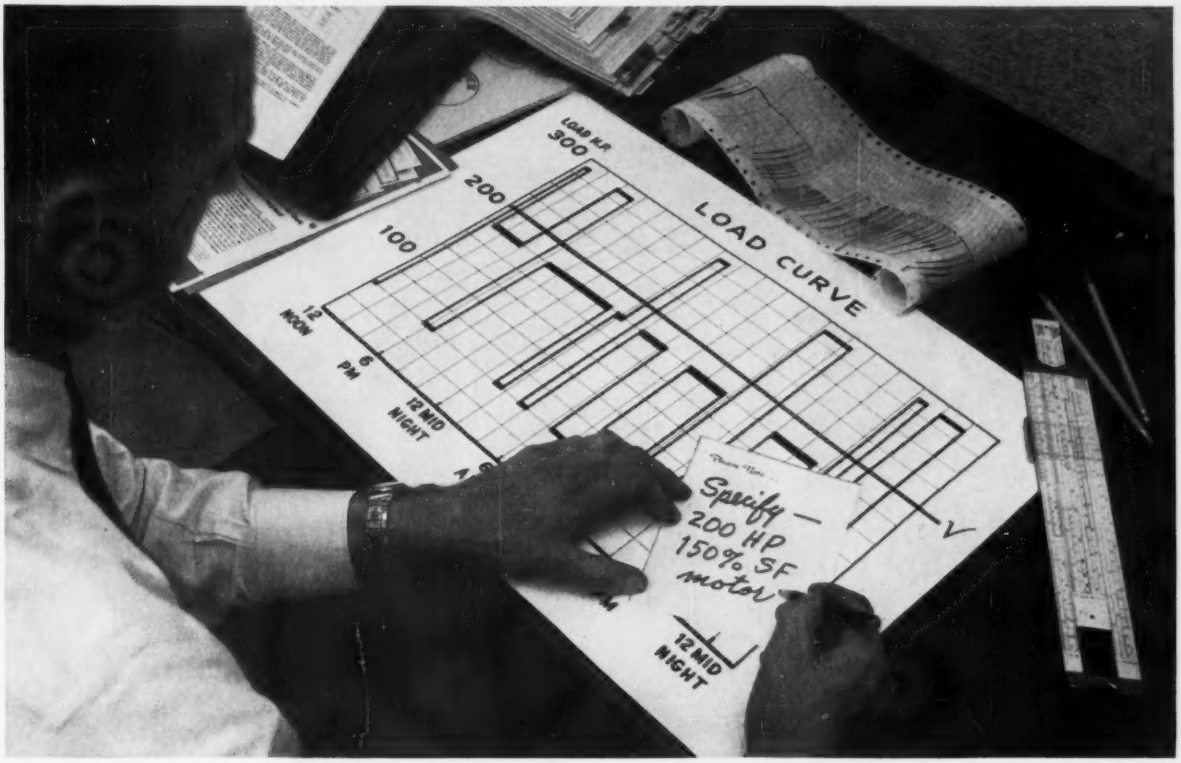
SILICONE NEWS from Dow Corning

Over-motoring Out-moded



Specify horsepower for nominal loads, Service Factor to handle the peaks!

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Where does this additional capability come from? It's the hidden horsepower in the higher service factor rating! It's the result of the exceptional thermal stability of silicone insulating materials.

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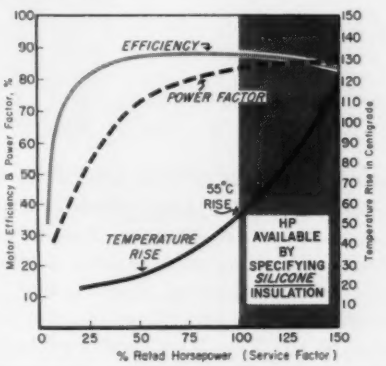
Additional savings in several ways: additional nameplate horsepower is usually more expensive than the extra service factor silicone insulation provides; additional horsepower requires extra floor space and heavier mountings; over-motoring power factor problems are eliminated or minimized.



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Maintain a low power factor by keeping the insulating oil clean, stable, and efficient. Because copper, oxygen and heat are present, the insulating oil in any paper insulated cable is subject to oxidation and gives off products that increase power factor. Anaconda greatly reduces this power factor increase by wrapping each conductor and the insulation in highly adsorbent carbon-black tapes. These patented tapes adsorb the oxidation products that the oil develops, keeps them outside the dielectric field. Result—the oil remains clean, pure and dielectrically stable far longer.

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For more information about Anaconda CB* cable, contact the Man from Anaconda or Dept. EFL-1-EW, Anaconda Wire and Cable Company, 25 Broadway, N. Y. 4, N. Y.

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CB* POWER CABLE

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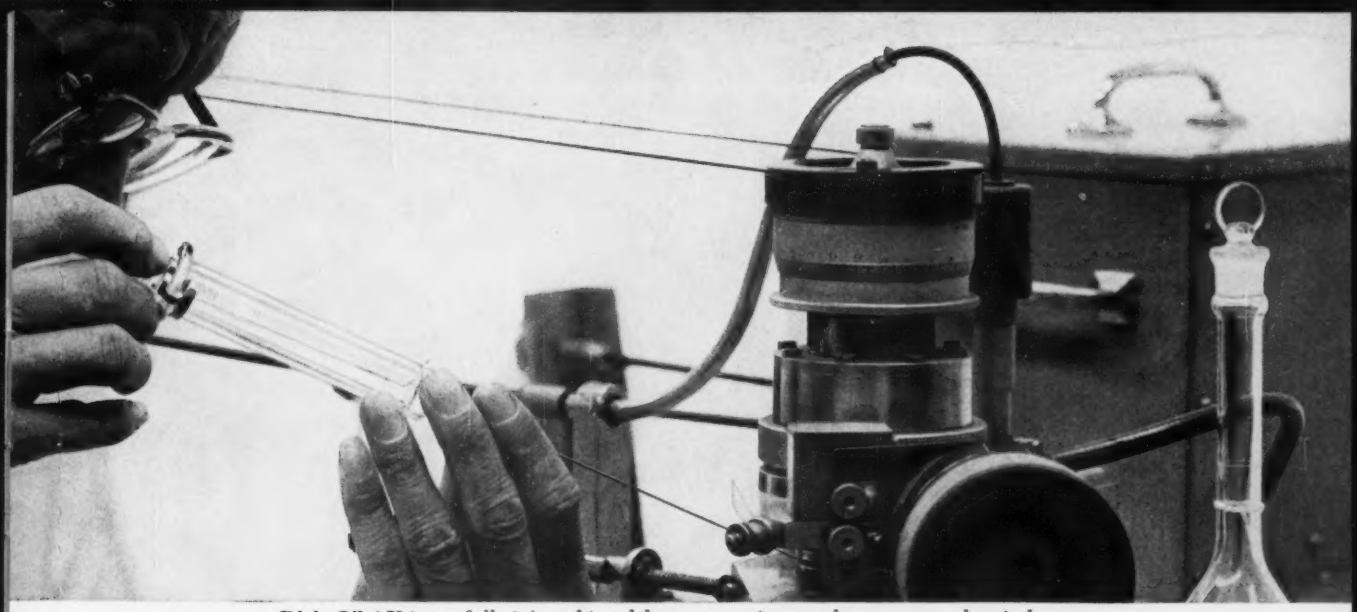
*Reg. U. S. Pat. Off.



Diala Oil AX is carefully injected into laboratory equipment that measures electrical properties of the oil. This is one of the ways Shell makes sure that dielectric strength is high.

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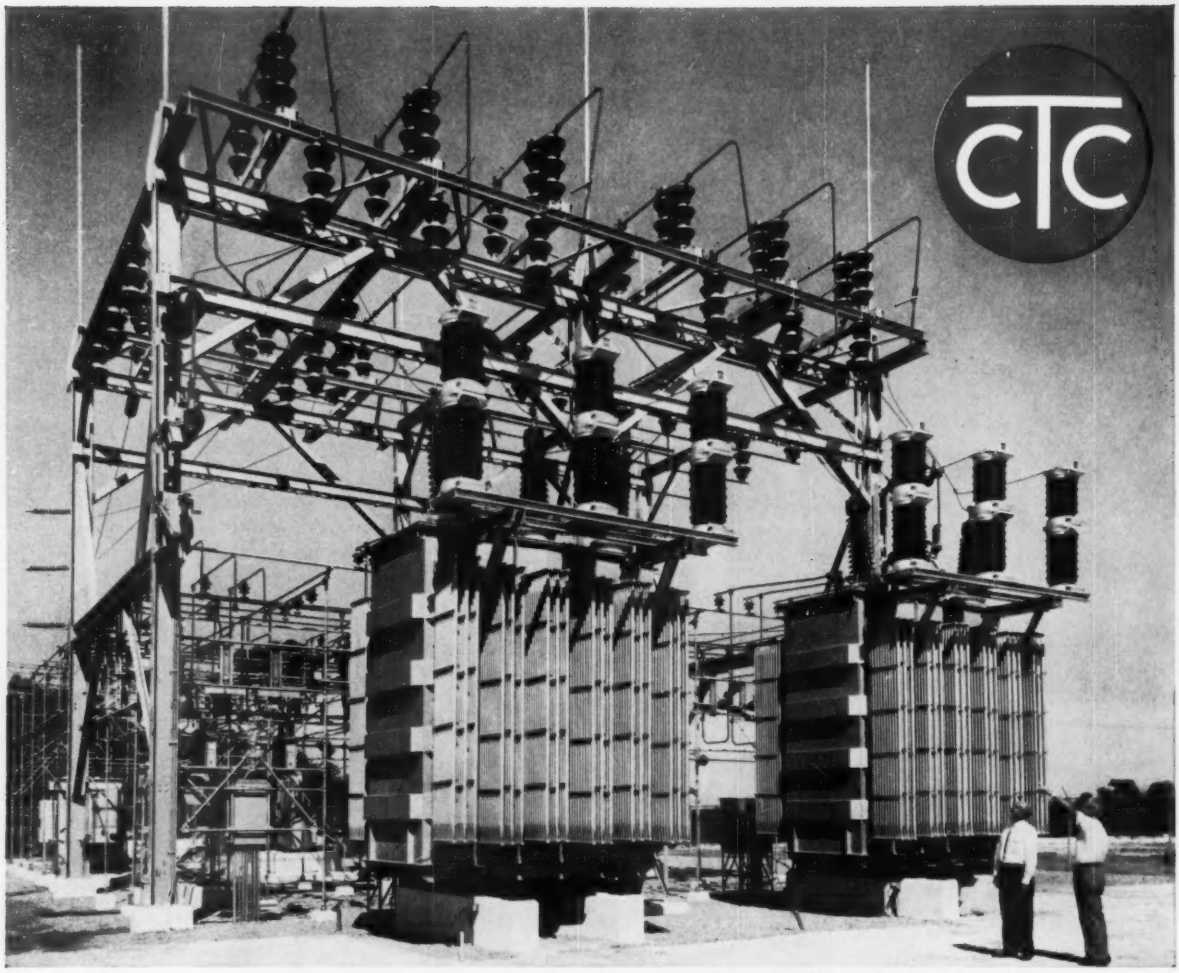

William H. Rutledge, district supervisor, and R. L. Johnson, administrative assistant, of Florida Power & Light Company inspect new South Daytona Beach sub-station installation.

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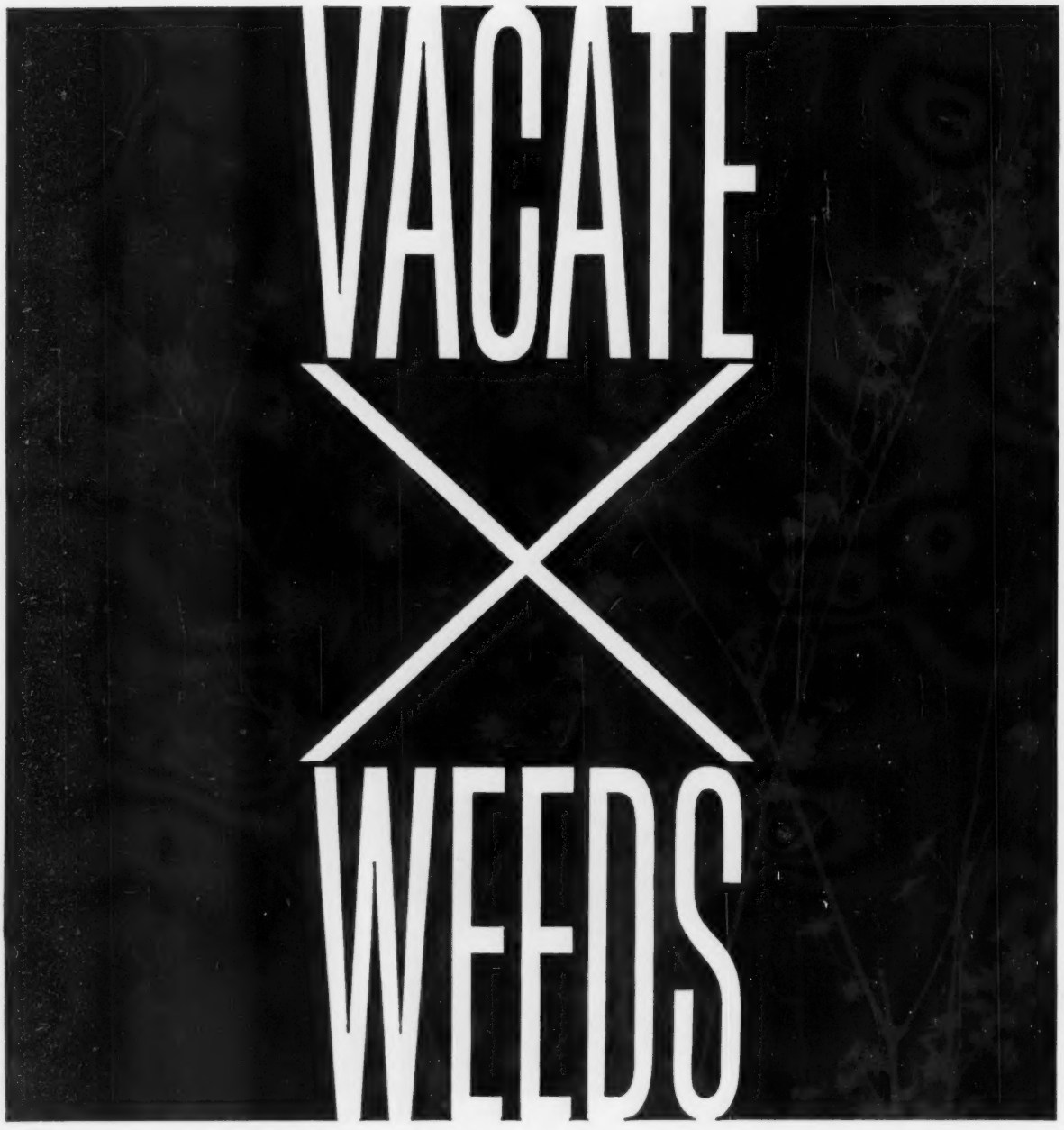

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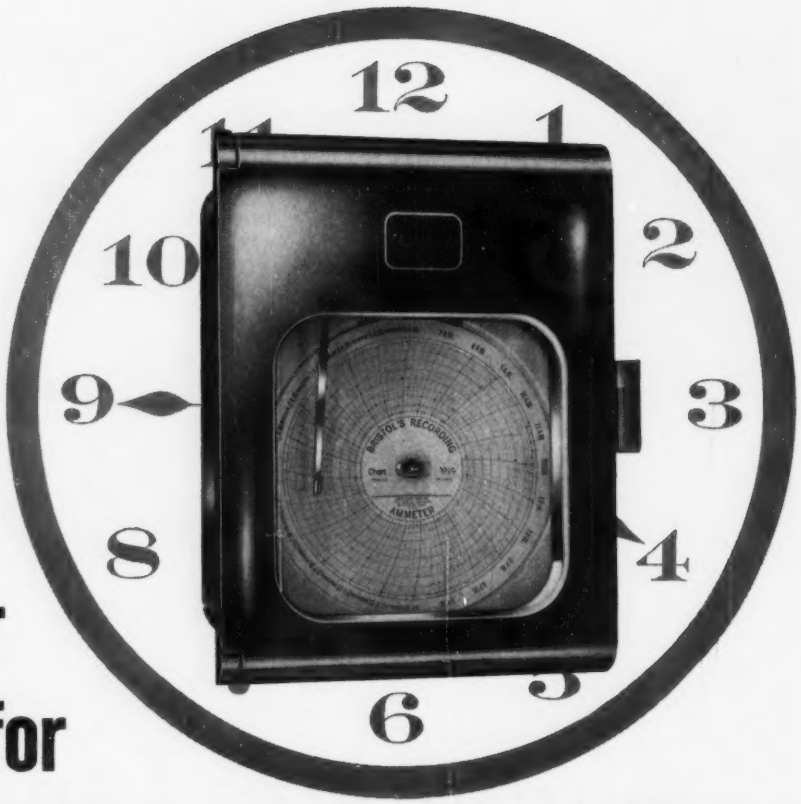

The recording ammeter for 'ROUND-THE-CLOCK RELIABILITY

. . . it's a Bristol, of course . . . featuring time-tested moving-iron elements, refined and improved by Bristol R & D

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CHAFING DAMAGE?

Fig. 1.
This badly abraded tie wire was removed and photographed during an inspection of the tie points on an undamped distribution line in a northwestern state. The line (1/0 ACSR - 6/1) was constructed in the Spring of 1959 and the utility made an inspection 17 months later. The damage was attributed entirely to Aeolian vibration.

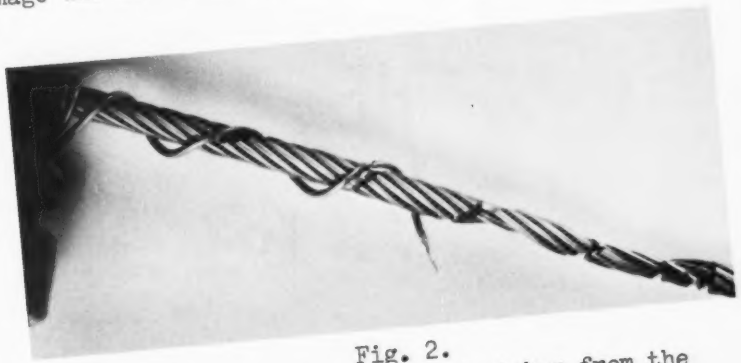
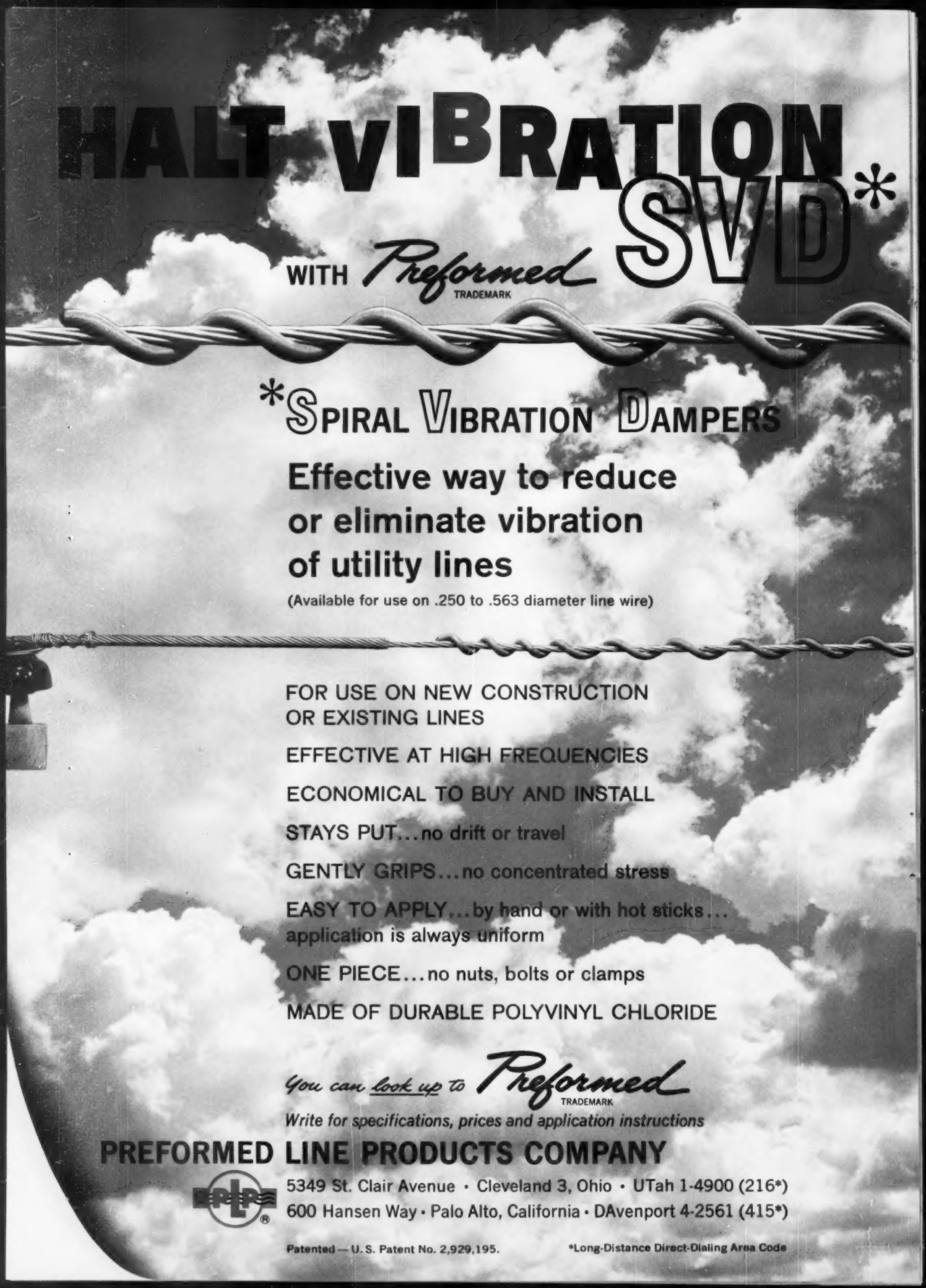
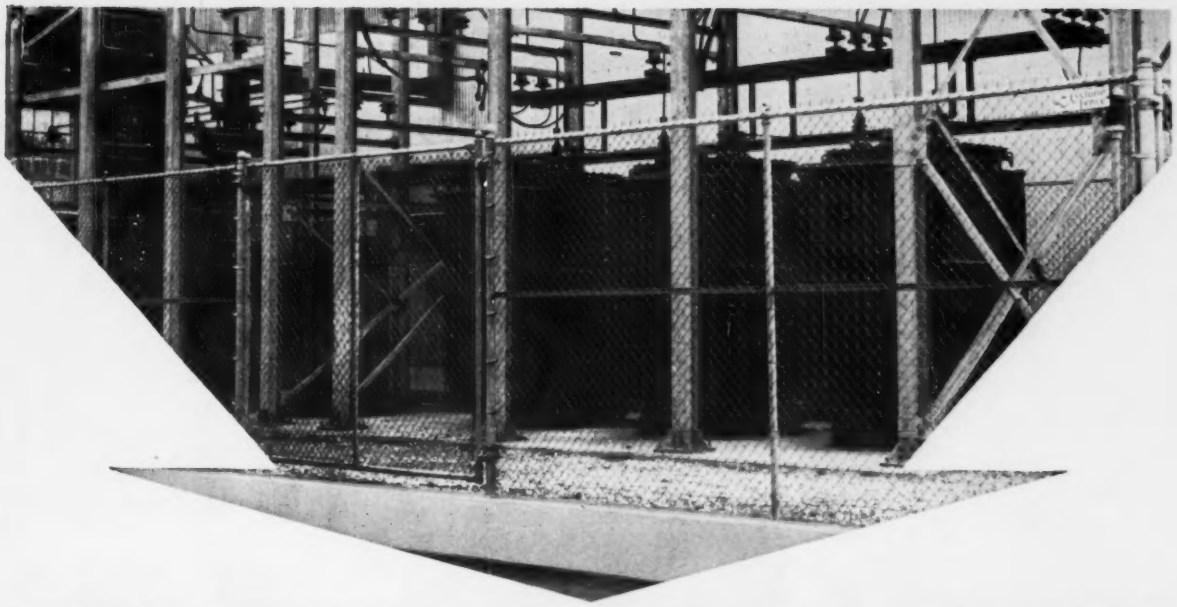


Fig. 2.
Deep gashes in the armor rod, taken from the same line, illustrates the excessive chafing damage resulting from Aeolian vibration on undamped lines in locations where wind, temperature, and terrain are conducive to sustained vibration. Without protective armor rods at the tie points, this damage would have occurred to the conductor.

See other side


HALT vIBRATION
WITH Preformed TRADEMARK
SVD*
*SPIRAL VIBRATION DAMPERS
Effective way to reduce or eliminate vibration of utility lines
(Available for use on .250 to .563 diameter line wire)
FOR USE ON NEW CONSTRUCTION OR EXISTING LINES
EFFECTIVE AT HIGH FREQUENCIES
ECONOMICAL TO BUY AND INSTALL
STAYS PUT... no drift or travel
GENTLY GRIPS... no concentrated stress
EASY TO APPLY... by hand or with hot sticks... application is always uniform
ONE PIECE... no nuts, bolts or clamps
MADE OF DURABLE POLYVINYL CHLORIDE
You can look up to Preformed TRADEMARK
Write for specifications, prices and application instructions
PREFORMED LINE PRODUCTS COMPANY
5349 St. Clair Avenue • Cleveland 3, Ohio • UTah 1-4900 (216*)
600 Hansen Way • Palo Alto, California • DAvenport 4-2561 (415*)
Patented — U. S. Patent No. 2,929,195.
*Long-Distance Direct-Dialing Area Code



SIX WAGNER® TRANSFORMERS PROVIDE THE POWER

Here are six Wagner® transformers with a full-time job: providing all the power needed by a new electroplating line that produces tin plate for Granite City Steel Company.

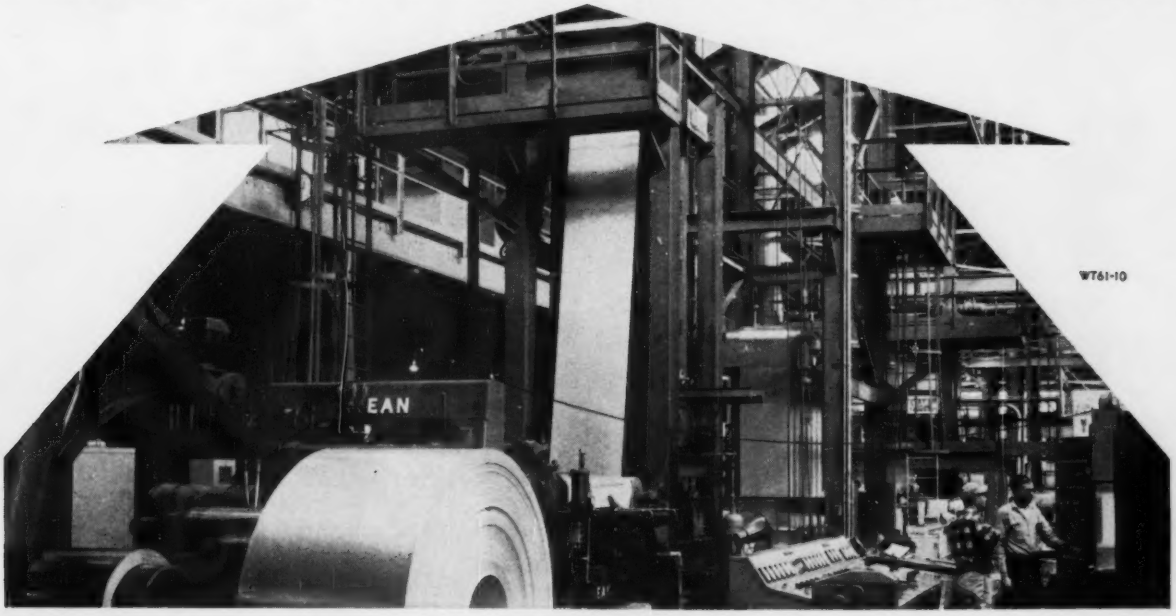
Three of the six supply power to motor-generator sets which convert to DC for variable speed drives, and to plating generation equipment and other major equipment drives. They are all 1667 kva, single phase, 60 cycles, 7200/12470Y to 2400/4160Y volts transformers.

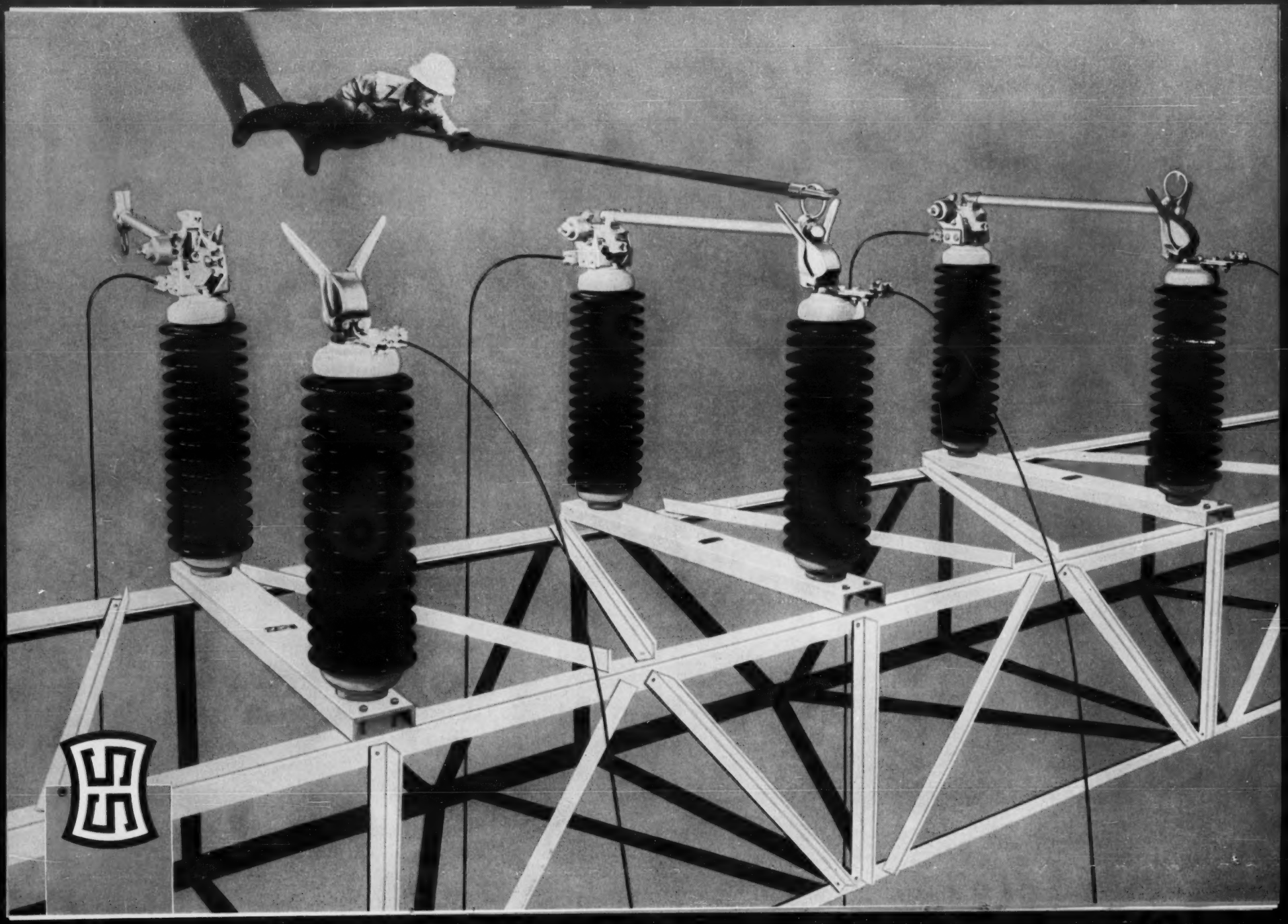
The second set of three transformers are all 500 kva, single phase, 60 cycles, 7200/12470Y to 240 x 480 volts. They supply power for auxiliary pumps, etc.

All six are of the latest design . . . have wound cores of cold-rolled oriented grain steel. Their performance stability is outstanding. They're built to be trouble-free . . . built to provide all the power the plating line needs. Wagner transformers are designed to provide all the power you need, too. Your Wagner Sales Engineer can show you how. Call him. Soon.

Wagner Electric Corporation
6456 PLYMOUTH AVENUE, ST. LOUIS 33, MO., U.S.A.

FOR GRANITE CITY STEEL'S NEW TIN PLATING LINE





DON'T OVERLOOK THE MECHANICAL CHARACTERISTICS WHEN EVALUATING YOUR POWER FUSES

Thermal and electrical characteristics rightfully deserve first consideration in evaluating power fuses, because the fuse must carry rated continuous current and interrupt rated short circuit currents to perform its primary function.

But from an operating and maintenance standpoint, the fuse's mechanical characteristics should not be overlooked. Here are nine of the most important features to consider:

1. **OPERATING RING** Can the fuse holder be easily disengaged from the latch? It is important that the operator have complete control over the fuse holder during the opening procedure. Southern States BPA and HPA fuses have full-circle operating rings to assure complete control.

2. **FUSE HOLDER REMOVAL** Can removal or replacement of the fuse holder be accomplished easily and simply? Special, cumbersome, rigs are objectionable to operating personnel. Southern States fuse holders are handled with a hookstick.

3. **SLEET HOOD** Are the top contacts fully protected from freezing rain, snow, or other foreign matter? Note the extra large hood on Southern States fuses.

4. **POSITIVE HOLDER GUIDE** Will the fuse holder make proper engagement with the top contact, even when closing is made from an oblique angle? Southern States fuses are equipped with generous guide arms on the sleet hood to position the holder properly, regardless of side thrust.

5. **POSITIVE IDENTIFICATION** After operation, does the position of the fuse clearly indicate that an operation has taken place? Southern States fuse holders swing to a fully open position and can be easily spotted from a distance.

6. **SHOCK ABSORPTION** After operation, does the fuse provide a sure means for bringing the fuse holder to a cushioned stop? Damage to the fuse mounting is prevented on Southern States fuses by properly designed snubbers.

7. **LINK PROTECTION** When the fuse holder is slammed closed, is there some means to prevent overstressing the link? To avoid the possibility of rupturing a link, mechanical locks on the BPA and HPA fuses absorb force transmitted through the bottom hinge assembly.

8. **RESTORING SERVICE** Is the fuse easily and economically restored to service after operating? Fuses that require elaborate replacement components to keep them in service are not only costly, but burdensome to both supply and operating personnel. A simple, inexpensive fuse kit is all that's needed to restore service with Southern States power fuses.

9. **SELF-LOCKING HINGE** When the fuse operates, are the fuse holder and fuse mounting locked together? For safety reasons and to avoid possible damage to nearby equipment, Southern States fuses are equipped with self-locking hinges.

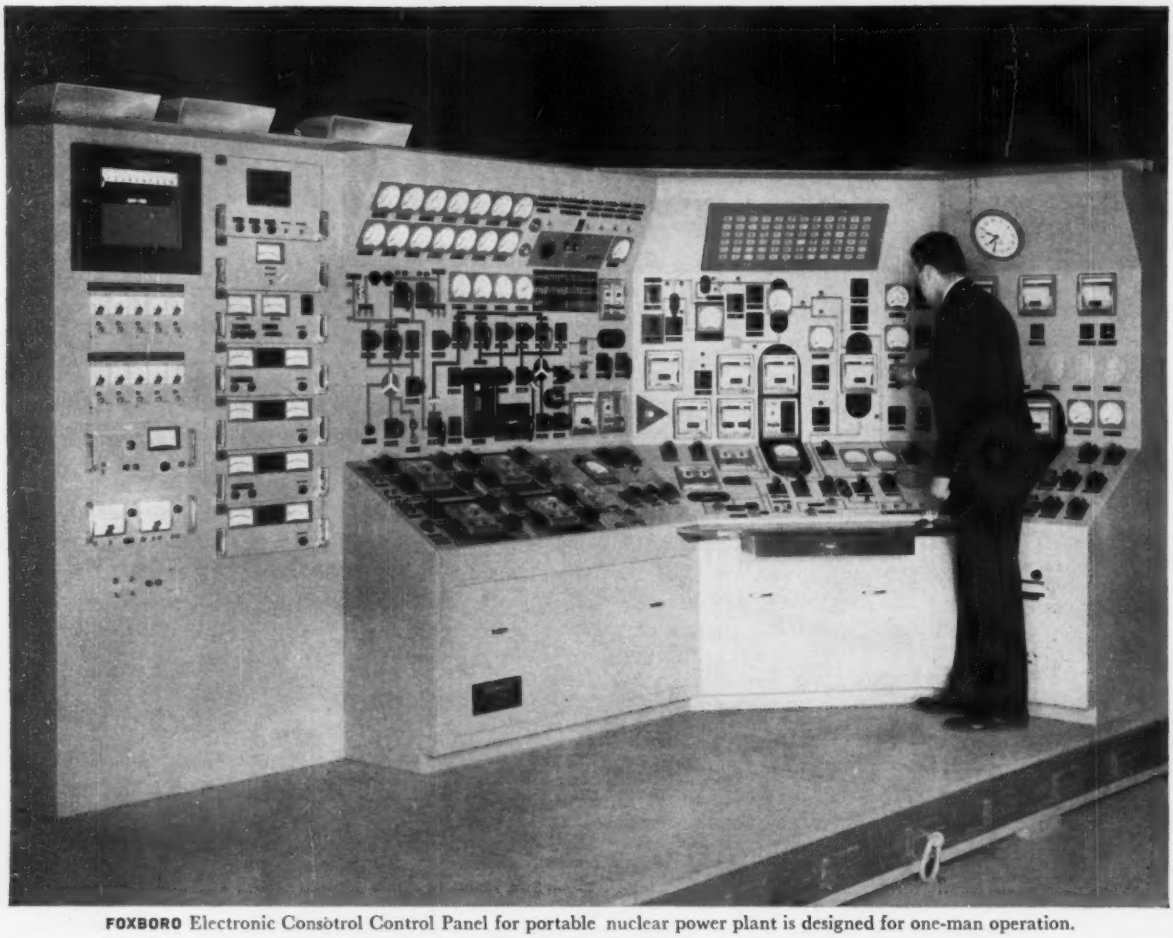
Before you buy your next power fuses make certain they measure up in every respect. Southern States BPA and HPA Power Fuses will.

For complete details, consult your Southern States representative, or write direct to us.

SOUTHERN STATES

HAMPTON, GEORGIA

IN CANADA: DOMINION CUTOUT CO., LTD., TORONTO



FOXBORO Electronic Consòtrol Control Panel for portable nuclear power plant is designed for one-man operation.

reactor control – plant control – radiation monitoring... they're all on this compact Foxboro Electronic Control Panel

SKID-MOUNTED Foxboro Consotrol panel, enclosed in a protective housing, will be "air-lifted" to its Air Force site, 6500 ft. up in the Wyoming mountains.

One skid — that's all the room allowed for control instrumentation on The Martin Company's PM-1 portable nuclear power plant.

The plant — being built for the Air Force under contract to the AEC — will produce both 1000 kilowatts of electrical power and 7 million btu per hour heat for a remote Air Force station high in the Wyoming mountains.

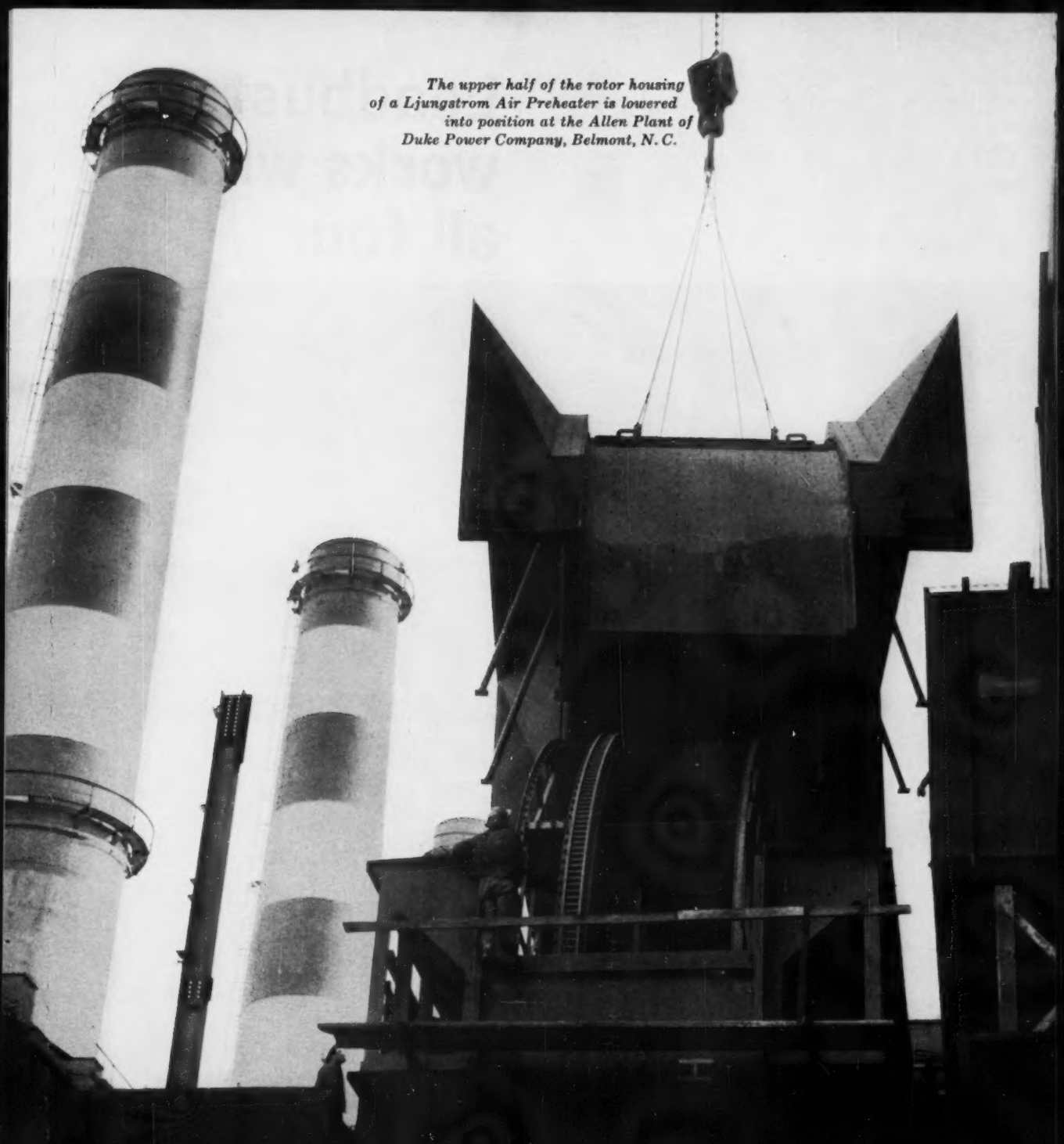
For the PM-1 Reactor, dependable Foxboro Electronic Consotrol* instruments were specified. 100% solid state — no vacuum tubes to replace — instantaneous response. And they're so compact that both nuclear and process control, as well as radiation monitoring, are included on the same operating console.

Compactness — reliability — proven performance — Foxboro Electronic Consotrols are ideal for both nuclear and conventional power plant control systems. Ask your Foxboro Field Engineer to show you the reasons why. Or write for Bulletin 1-17. The Foxboro Company, 245 Norfolk St., Foxboro, Massachusetts.

*Reg. U.S. Pat. Off.

FOXBORO

REG. U. S. PAT. OFF.



The upper half of the rotor housing of a Ljungstrom Air Preheater is lowered into position at the Allen Plant of Duke Power Company, Belmont, N. C.

IN NORTH CAROLINA . . .

DUKE POWER INSTALLS ITS 47th LJUNGSTROM®

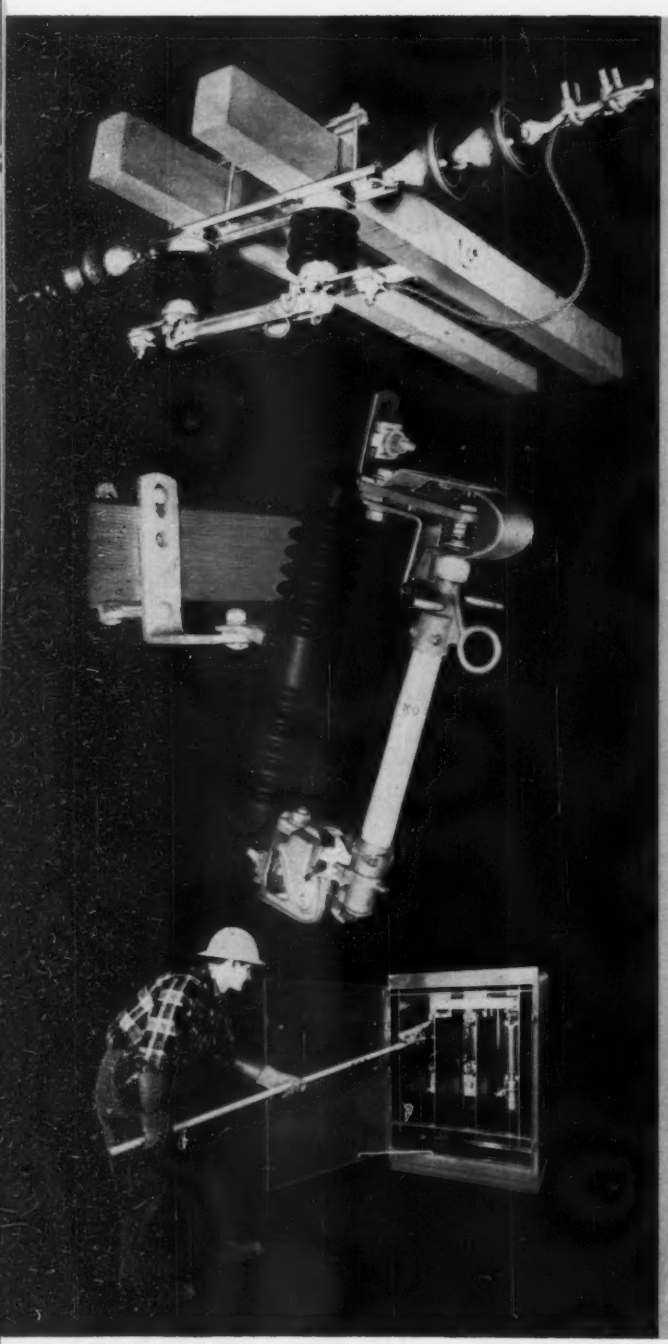
Duke Power engineers expect 10% annual fuel cost savings with Ljungstrom Air Preheaters at Belmont. Two 512,000-lb Ljungstroms on the #5 boiler of the Allen Plant will preheat incoming air from 80°F to 575°F. Continuous rotary regeneration will recover approximately 390°F waste heat. Every 40° thus recovered cuts fuel requirements 1%.

Our engineers will be glad to recommend how Air Preheater equipment can improve your operating results on new or existing fuel fired units.

THE AIR PREHEATER CORPORATION

60 East 42nd Street, New York 17, N.Y.

Loadbuster works with all four



Portable loadbreak tool is usable with cutouts, disconnects, power fuses, and pad mounted gear

Loadbuster, S&C's portable loadbreak tool, earns its own way by providing truly unlimited load switching when and where it's needed. With its load switching range through 400 amperes at any system voltage through 14.4 kv, Loadbuster works with cutouts, disconnects, power fuses, and pad mounted gear.

Within its voltage range, Loadbuster can interrupt full loads through 400 amperes, all associated magnetizing and line charging currents, and can switch all typical capacitor banks. Thus, this easy-to-carry switching device:

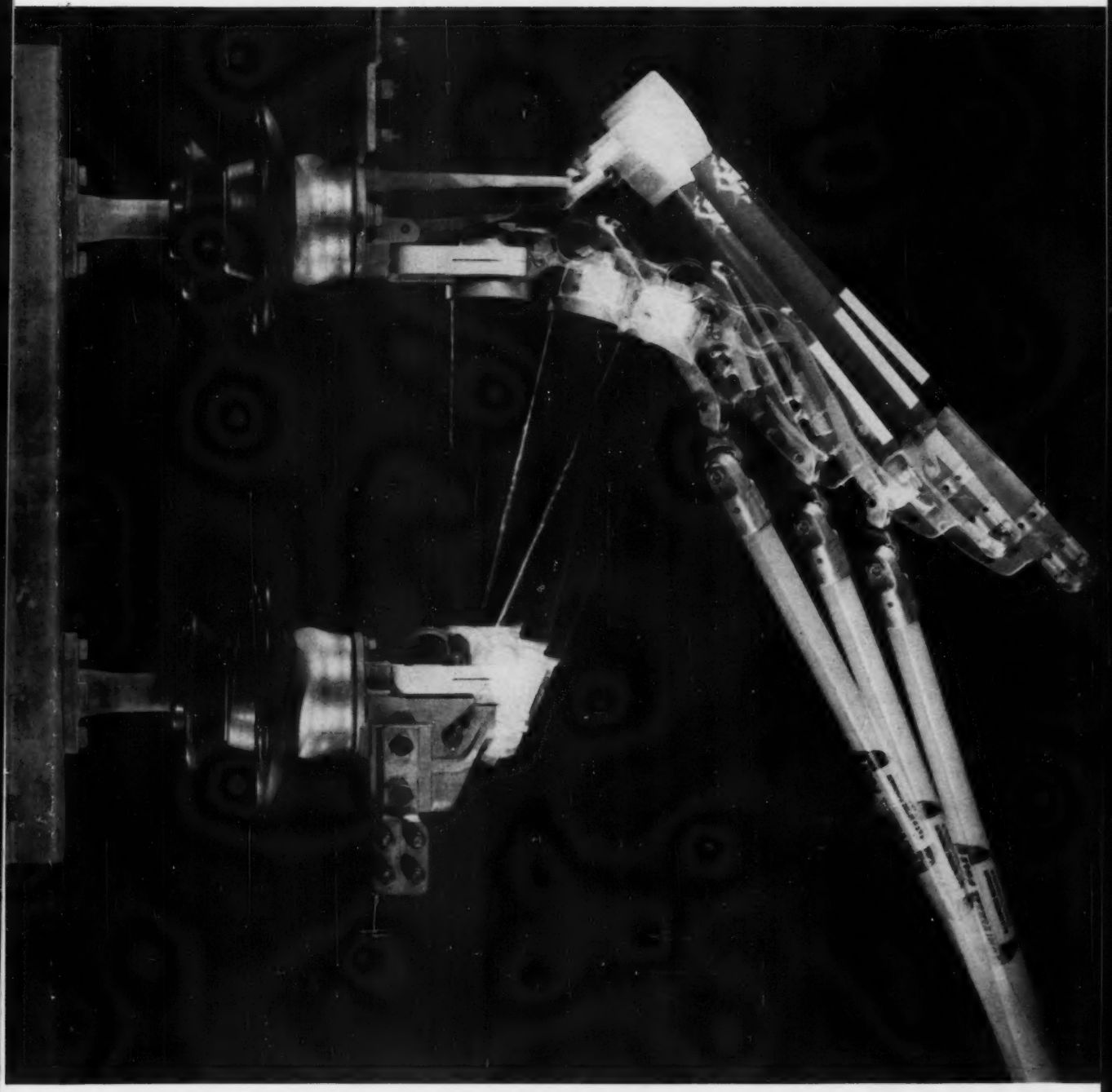
- Replaces link break cutouts
- Provides full load switching for cutouts and power fuses
- Replaces group operated disconnects with stick operated disconnects at sectionalizing points
- Provides full load switching for hookstick disconnects
- Replaces load interrupter switches where group operation is unnecessary
- Brings overhead switching practices to residential underground

Loadbuster's portability, versatility, and long operating life (it's designed for daily field usage) have made it standard equipment on many utility service trucks. Ask your S&C representative for a demonstration of how Loadbuster can cut your operating costs.

S&C ELECTRIC COMPANY

4421 Ravenswood Avenue • Chicago 40, Illinois

Specialists in High Voltage Circuit Interruption since 1911



You simply hook Loadbuster across the upper contact of a disconnect or fuse and open it in the normal way. There is no arc, link breakage, contact burning, or danger to the operator. Just disengage the device and it's ready for instant use again.

Gulf States Utilities bought the versatile ISI 609 Information and Computer System

609

Now passing the 6,000 hour mark for continuous operation with only minor maintenance, this ISI 609 computes station heat rate, by input-output method, of Units 1, 2 and 3 at Roy S. Nelson Station. Calculations are based on direct computer measurements of temperatures, pressures, and flows. Over 200 variables are continuously scanned for alarm detection and hourly logging on automatic typewriters.

Practical information for profitable control

With over 130 data systems now operating in utilities and process plants, Information Systems, Inc. offers eleven years of experience in all phases of industrial data gathering, information display and computer information systems. An exceptionally broad, completely integrated service is backed by proven hardware designed for reliable, economical control systems. ISI Information Systems guarantee practical information and exceptional versatility.

YOUR COMPANY undoubtedly will install a control system. Will it supply useful, meaningful information immediately? Will it improve plant efficiency and product quality with economic feasibility? Will it furnish closed loop, fully automated control with economy whenever you take the final step? *Your executives should evaluate ISI before you buy. Please write for capability and case history data, or contact your nearest ISI office.*

YOUR BEST INVESTMENT IN POWER AND PROCESS CONTROL • INFORMATION HANDLING • INDUSTRIAL AUTOMATION • NATURAL GAS DISPATCHING

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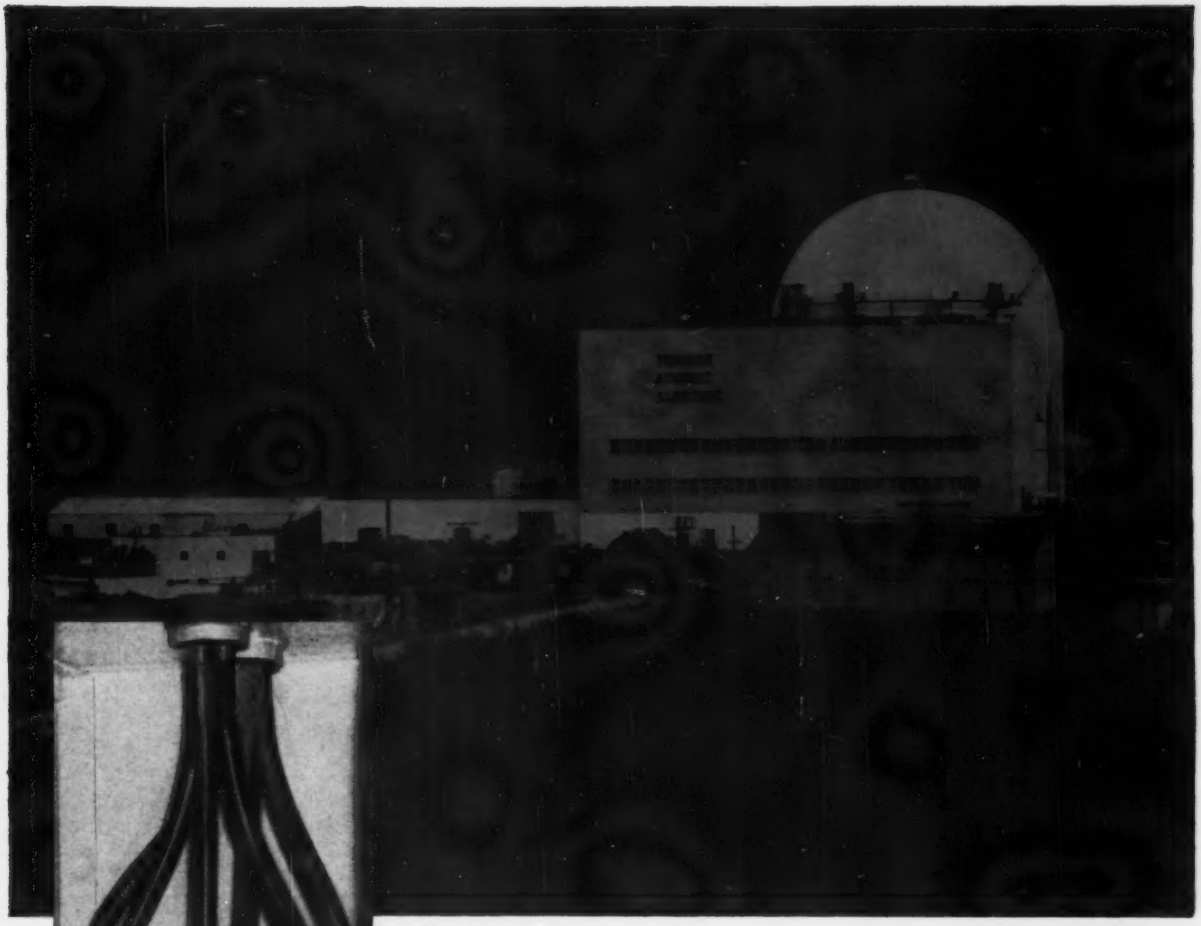
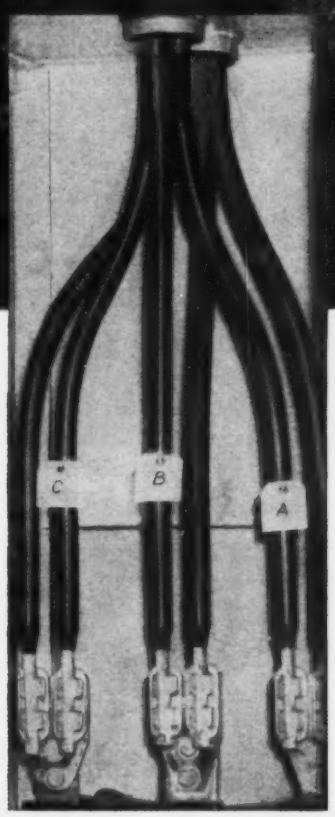




ARTERIES FOR THE POWER OF THE ATOM

In Rowe, Massachusetts, the Yankee Atomic Electric Company has built one of the first commercial atomic power plants in the U.S.

This engineering marvel, designed to transform the destructive power of the atom into useful electrical energy, utilizes no less than 200,000 feet of Simplex wire and cable, some of which is exposed to radiation.

For top performance in all types of installations, utilities and industrial companies the world over rely on the products of Simplex research and development.

Simplex
WIRE & CABLE CO.
Cambridge, Mass. • Newington, N. H.

THE NEWEST REASON TO MAKE YOUR NEXT 2-TONNER A FORD

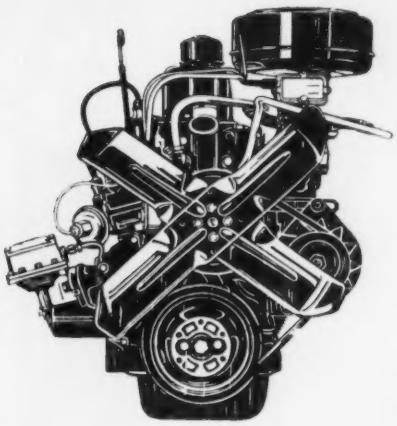
ALL-NEW FORD BIG SIX

262 CU. IN. TRUCK ENGINE

FORD DIVISION, *Ford Motor Company*

Ford C-600—America's lowest-priced* two-ton tilt-cab truck by $155 to $308! Here's tilt-cab maneuverability, service accessibility and load capacity, plus greater reliability. Maximum GVW 21,000 lb., GCW 32,000 lb.

*Based on a comparison of latest available manufacturers' suggested retail prices



Now, the rugged simplicity of a big 262-cubic-inch Six is combined with the dependability of heavy-duty, *exclusive-truck* engine design. Forged steel crankshaft, stress-relieved head and block, full-floating piston pins, stellite-faced intake and exhaust valves, positive exhaust valve rotators, and positive crankcase ventilation are typical of the advances you get in this powerful Six.

The new Big Six is one of *four* engine choices in Ford two-tonners for '61—including America's most popular truck V-8's. See your Ford Dealer. He will be glad to help you select the best engine for your job.

SEVEN MORE REASONS

WHY IT'S GOOD BUSINESS TO DO BUSINESS WITH FORD!

You save from the start with Ford's traditionally low prices, and your savings continue with low operating and maintenance costs. These facts are documented by certified test reports from America's foremost independent automotive research firm. Ask to see these reports. They're on file at your Ford Dealer's.

In addition to these dollar-and-cents savings, the following bonus benefits are yours with Ford Trucks:

1. **Rigid quality controls** give you the strongest safeguard of truck reliability ever. Modern, *exclusive-truck* manufacturing facilities, with emphasis on quality every step of the way, are designed to give you a Ford Truck that is as free from defects as a truck can be. Tangible results of these high standards are Ford's new warranties.

2. **Exclusive 100,000-mile warranty** (or 24 months) on 401-, 477- and 534-cu. in. Super Duty V-8's is the most liberal in the industry. Each major engine part (including block, heads, crankshaft, valves, pistons, rings), when engine is used in normal service, is warranted by your dealer against defects in material or workmanship for 100,000 miles or 24 months, whichever comes first. The warranty covers full cost of replacement parts . . . full labor costs for first year or 50,000 miles, sliding percentage scale thereafter.

3. **12,000-mile warranty** (or 12 months) on all 1961 Ford Trucks of every size is further evidence of the confidence Ford has in its quality controls. Each part, except tires and tubes, is now warranted by your dealer against defects in material or workmanship for 12 months or 12,000 miles, whichever comes first. The warranty does not apply, of course, to normal maintenance service or to the replacement in normal maintenance of parts such as filters, spark plugs and ignition points.

4. **Special fleet financing** can be arranged by your Ford Dealer. It's available for owners of two or more trucks, and provides the opportunity to precisely tailor payments to your income patterns or depreciation schedules. This fleet-fitted financing offers substantial savings and frees your working capital.

5. **Sales engineers and service specialists** in 36 district offices are on call to solve special truck problems. Working with both dealers and customers, these experienced truck men represent another extra step Ford takes to provide your continued satisfaction.

6. **Replacement parts depots** at 26 strategic locations across the country quickly supply needed parts from ample stocks. Ford's entire supply system is geared to give you faster service and reduce costly downtime . . . *wherever* you are.

7. **6,800 Ford Dealers,** including 280 specialized Heavy Duty truck dealers, can keep your trucks ready to go wherever they go. From coast to coast, fast Ford service—gas *and* Diesel—is always close at hand.

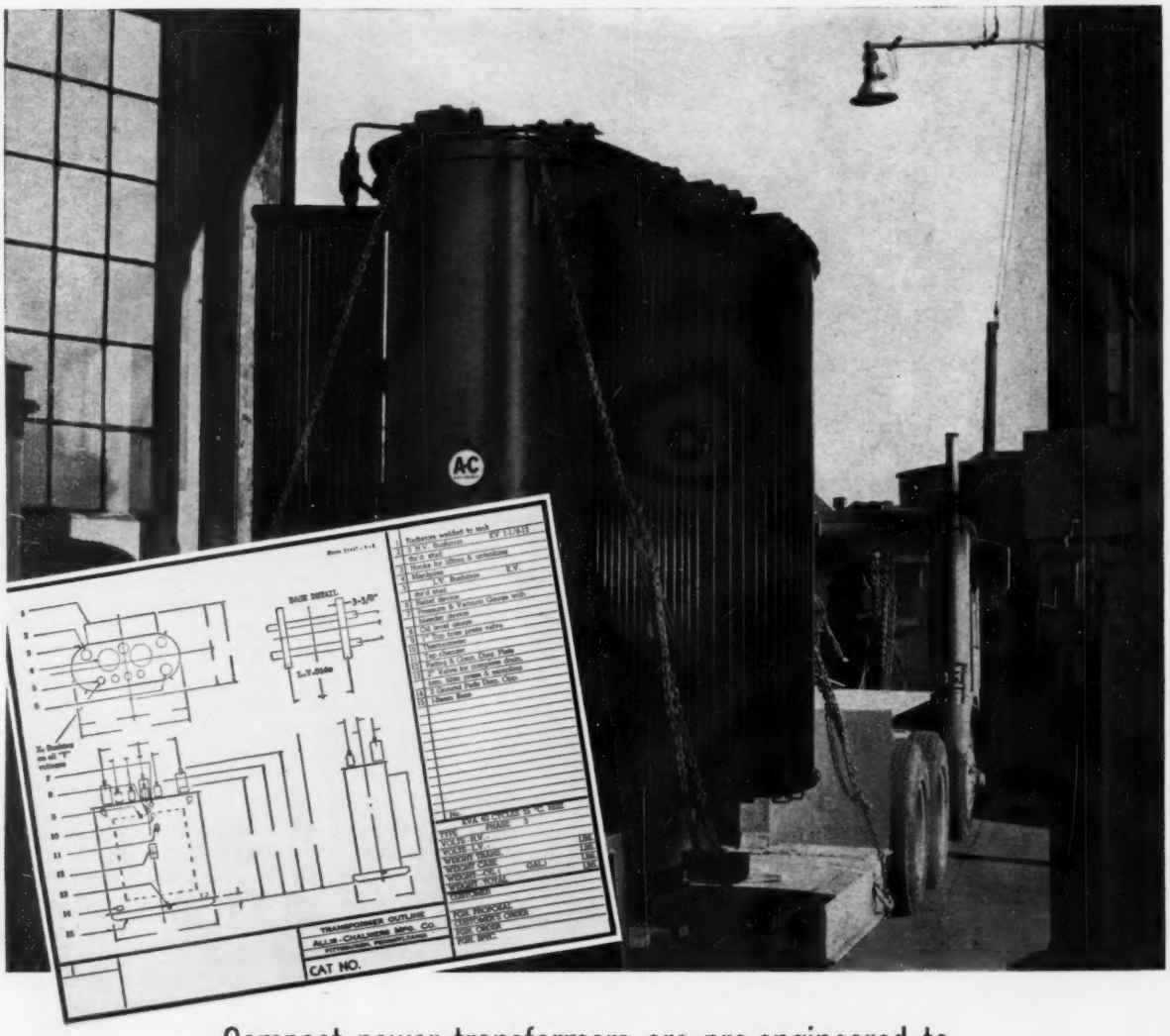
From Super Economy pickups to Diesel-powered tractors, you can now fill every truck need up to 76,800 pounds GCW with a modern, money-saving Ford Truck.

FORD TRUCKS COST LESS

SEE YOUR FORD DEALER'S "CERTIFIED ECONOMY BOOK" FOR PROOF!

ALLIS-CHALMERS

A-1437



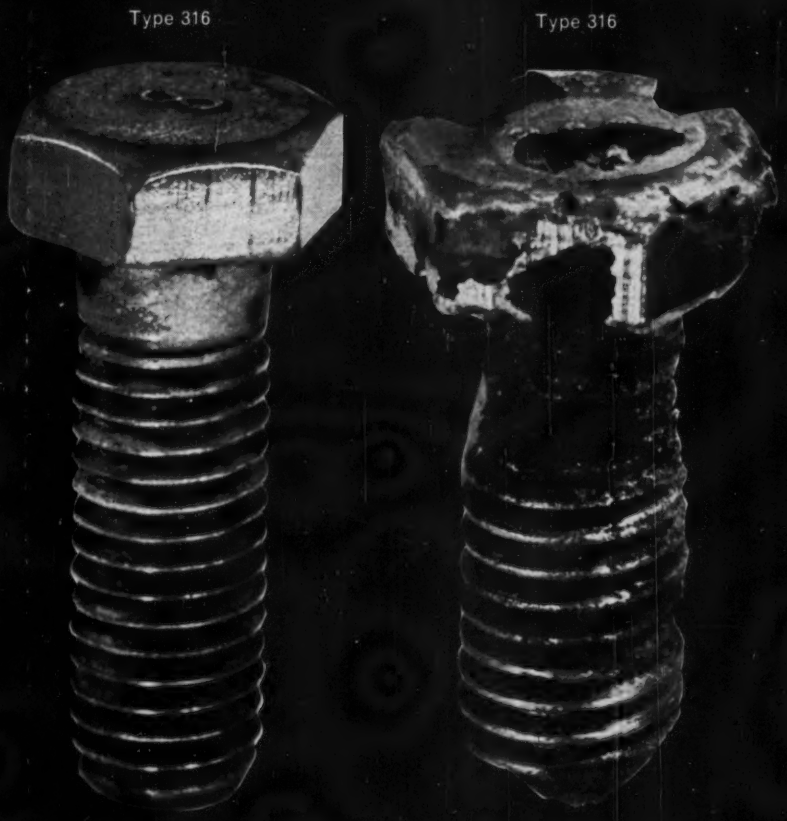
Compact power transformers are pre-engineered to

simplify your station planning!

Advance engineering information for customers — actual outline drawings (shown above) with certified dimensions and weights — is sent with every A-C small power transformer quotation. With this information, you can *immediately* plan your station layout — figure foundation sizes, mounting details. No time-consuming preliminary engineering.

And no delivery delays! Pre-engineered major components are stocked. Your small power transformers are scheduled for manufacture as soon as your order is received. Installation costs are lower too. Low height—easier handling due to low center of gravity. Less weight — more economical pad or pier foundations. Low noise level — ideal for residential areas. Maintenance? Much simpler, with no external dirt-catching tank bracing.

These compact power transformers are available in 7500 kva and below, 69 kv and lower. See your nearby A-C office for details or write **Allis-Chalmers,** *Power Equipment Division, Milwaukee 1, Wisconsin.*



story of two bolts...

Both of the bolts shown above were used on the *same* application, in the *same* factory, and faced the *same conditions*.

The bolt on the left is a Harper type 316 Stainless Steel bolt shown after three years of service. The bolt on the right is another manufacturer's bolt, identified as type 316 Stainless Steel, shown after only three months of service.

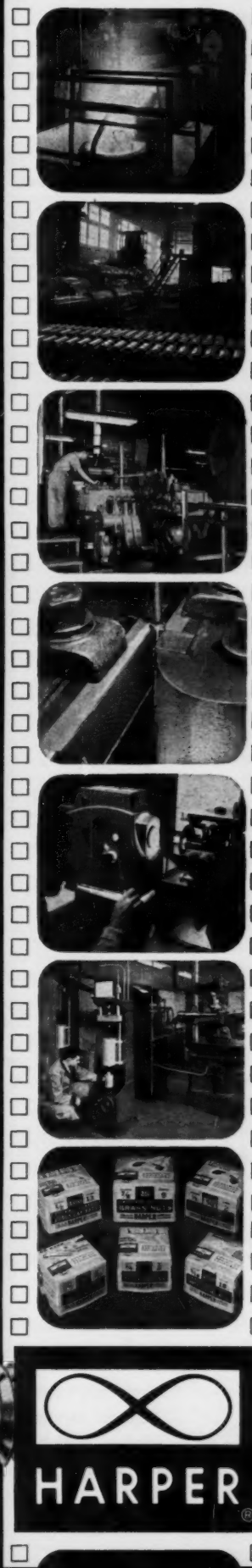
The dramatic fact that the Harper bolt lasted twelve times longer (and is still in service) is proof of Harpers' metallurgical control of alloys from "billet to bolt" in our completely integrated factory. Harper's corrosion-resistant fastenings, immediately available in a wide range of alloys and sizes, assure you that *your* products will be built to last no matter what the application may be.

Harper Distributors everywhere maintain complete stocks. Consult your Yellow Pages.

Write today for free copy of Harper's new "Strength" booklet —a factual treatise on important fastening metallurgy.

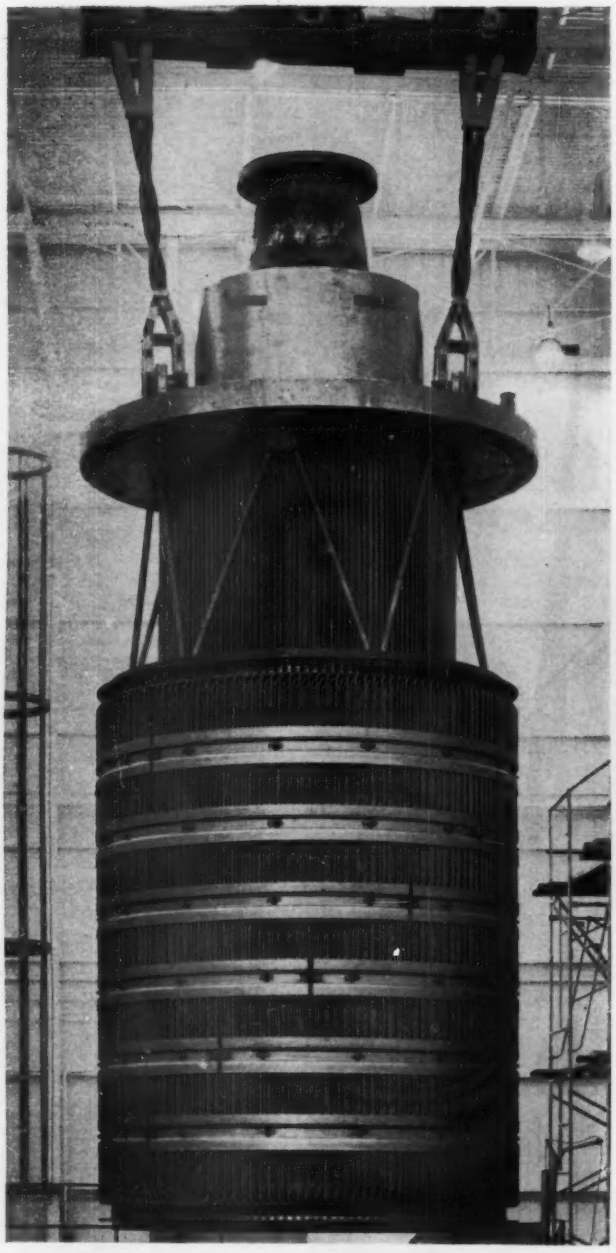
shaping metals that shape your future

THE H. M. HARPER COMPANY
8200 Lehigh Avenue • Morton Grove, Illinois



HARPER®

TOMORROW'S POWER



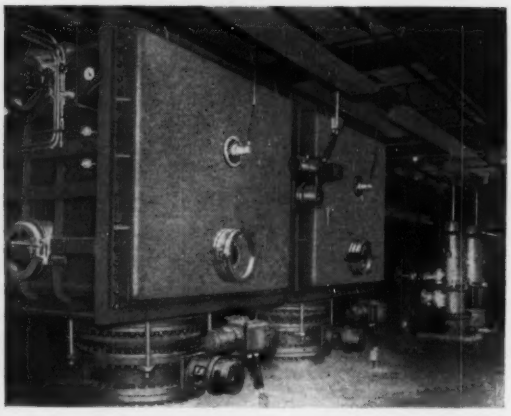
and

C. H. WHEELER / GRISCOM-RUSSELL

COMBINED INGENUITY

AND SKILL BUILT IT.

Three identical Griscom-Russell Vertical Once-Through Involute Tube, Liquid Sodium Heated Steam Generators (one of which is shown here)—have been installed and are being tested at the Enrico Fermi Power Plant built by the Power Reactor Development Corporation. These generators—first of their kind ever built—are an important break-through in the continuing efforts to produce steam from nuclear power more economically.



This 50,000 sq. ft. C. H. Wheeler Condenser at the new Indian River Plant of the Orlando (Florida) Utilities Commission, serves the 78,500 (rated capacity) turbine-generator. Its special deaerating features saved money in installation costs. C. H. Wheeler Ejectors, Circulators and the Condensate Pumps shown at the right also serve this new plant.

GRISCOM-RUSSELL / **C. H. WHEELER**

Massillon, Ohio — Philadelphia 32, Pa.

From this combined source you may now select condensers, circulating, condensate and general service pumps, steam jet ejectors, feedwater heaters, evaporators, generator gas coolers, tank heaters, heat exchangers, or special steam generators . . . all engineered and coordinated to meet the performance and space requirements of your power station.

...AND YOU DON'T HAVE TO CHANGE YOUR FIXTURES!

NEW WESTINGHOUSE HIGH EFFICIENCY LAMPS GIVE YOU 1/3 MORE LIGHT AT NO EXTRA COST!

YOU'RE LIGHT-YEARS AHEAD WITH WESTINGHOUSE . . . and the brightest, most economical fluorescent lamps you can buy! Now you can increase lighting levels without changing a single fixture . . . without increasing power costs . . . and without paying premium lamp prices. New Westinghouse "High Efficiency" fluorescent lamps give you a full third more light than daylight lamps . . . and 15% more light than cool white lamps . . . without consuming an extra watt of power!

"H.E." lamps are so new even the color tint is different—and only Westinghouse has it! A special blend of phosphor particles coating the inside of each lamp provides the higher lumen output . . . with a pleasant and restful green tint. Users everywhere feel this new green-white light gives a softer, more comfortable light . . . the most efficient light yet. Try "H.E." lamps in an entire area. If you don't agree that they provide the most efficient light ever, we will gladly exchange them for any Westinghouse fluorescent, any color shade, of your choice!

With "H.E." and other Westinghouse lamps, the Westinghouse Lighting Cost Reduction Plan gives you one or more of these benefits:

1. **Reduced cost of lamp purchases!**
2. **Reduced lamp replacement labor costs!**
3. **Increased lighting level for the same or lower costs!**
4. **More efficient use of power!**

Order new Westinghouse "H.E." lamps today and get more information on the Lighting Cost Reduction Plan from your authorized Westinghouse Lamp Agent or your nearest Westinghouse Lamp Sales Office! *You can be sure...if it's Westinghouse.*

Westinghouse

Westinghouse Lamp Division, Westinghouse Electric Corporation, Bloomfield, New Jersey

IN POWER PIPING RESEARCH

QUALITY COMES FIRST AT KELLOGG

A long-established program of metallurgical and welding research is the basis for the superior quality of Kellogg-manufactured power piping systems. It has led to new raw materials, new manufacturing techniques, new performance standards—and a better product.

Kellogg's laboratories at the Williamsport power piping center have few equals in the industry. They undertake physical, mechanical, and chemical testing, and evaluation of materials on a continuing basis.

These research facilities also serve as a customer service laboratory.

To learn how Kellogg's complete power piping service—which includes engineering, manufacturing, and erection—assures the best investment in new systems, write for 20-page brochure.

POWER PIPING DIVISION / THE M. W. KELLOGG COMPANY

Plant & Headquarters: Williamsport, Pennsylvania • A Subsidiary of Pullman Incorporated

Sales Offices: 711 Third Ave., New York 17; 200 S. Michigan Ave., Chicago 4 • Agent: Birmingham, Ala.

POWER PIPING

M KELLOGG W

HEADQUARTERS

A patented,* electronic testing system subjects Moloney Distribution Transformers to all standard tests and automatically rejects any unit which does not meet Moloney's standards of performance.

Automatic testing was developed by Moloney Electric Company to eliminate the possibility of human error in transformer testing and to improve quality control. Users can be sure that Moloney Transformers have successfully passed all tests and are electronically approved for service.

This patented,* automatic test system is one of many Moloney developments leading the way to better products for transformation. Specify electronically proven Moloney Distribution Transformers.

ME61-8

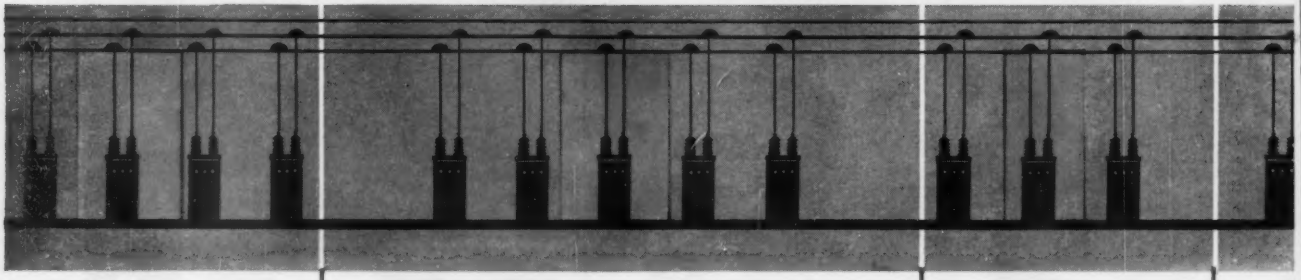
PATENTED* SYSTEM ELECTRONICALLY TESTS MOLONEY

MOLONEY ELECTRIC COMPANY

Since 1896... MORE POWER TO YOU

ST. LOUIS 20, MO., AND TORONTO, ONT., CANADA

*U. S. PATENT NO. 2905891



RATIO TEST

Supplements complete ratio test given each core-and-coil unit before tanking, checks each transformer for correct voltage ratio and ratio adjuster position.

IMPULSE TEST

Proves each transformer capable of withstanding over-voltages resulting from lightning and switching surges by overstressing bushings, layer, turn and divisional insulation as well as insulation between high and low voltage windings, and between the windings and ground.

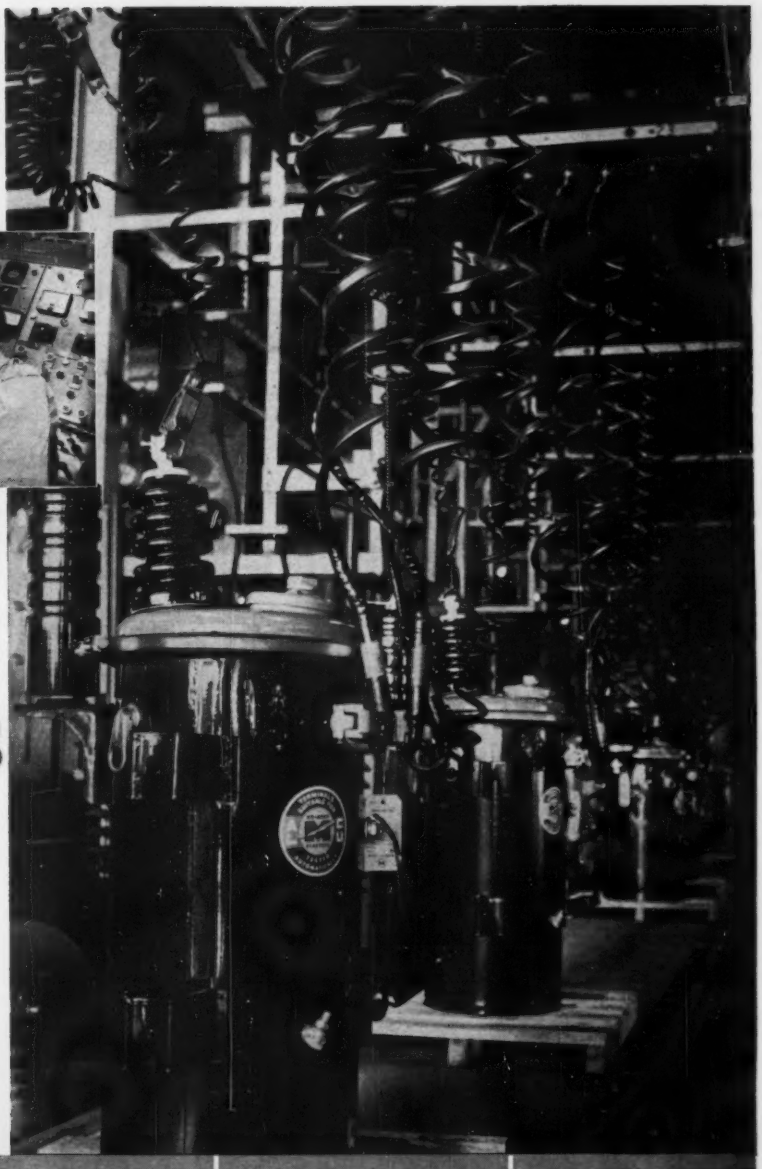
INDUCED POTENTIAL TEST

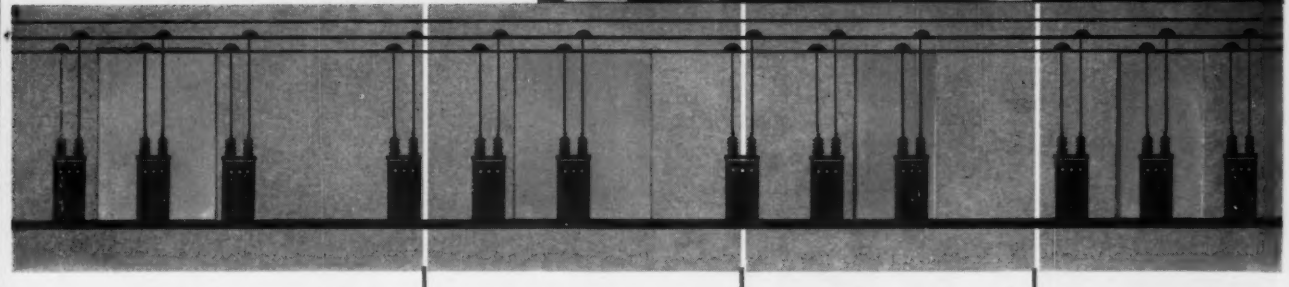
Proves turn, layer and divisional insulation quality of high and low voltage windings.

TEST SYSTEM—After completion of all assembly operations, a moving belt conveyor transports transformers through the automatic test system. Leads connecting the transformers to overhead dollies are attached before the transformers enter the test area. Power for each test is supplied... automatically ... by overhead bus at each test station.

CONTROL ROOM—Central control room houses all test station controls, test metering and recording equipment, and electronic rejection circuits.

TRANSFORMERS





APPLIED POTENTIAL TEST

A low-frequency, high-voltage test of insulation quality between high and low voltage windings, and between windings and ground.

CORE LOSS AND EXCITING CURRENT TEST

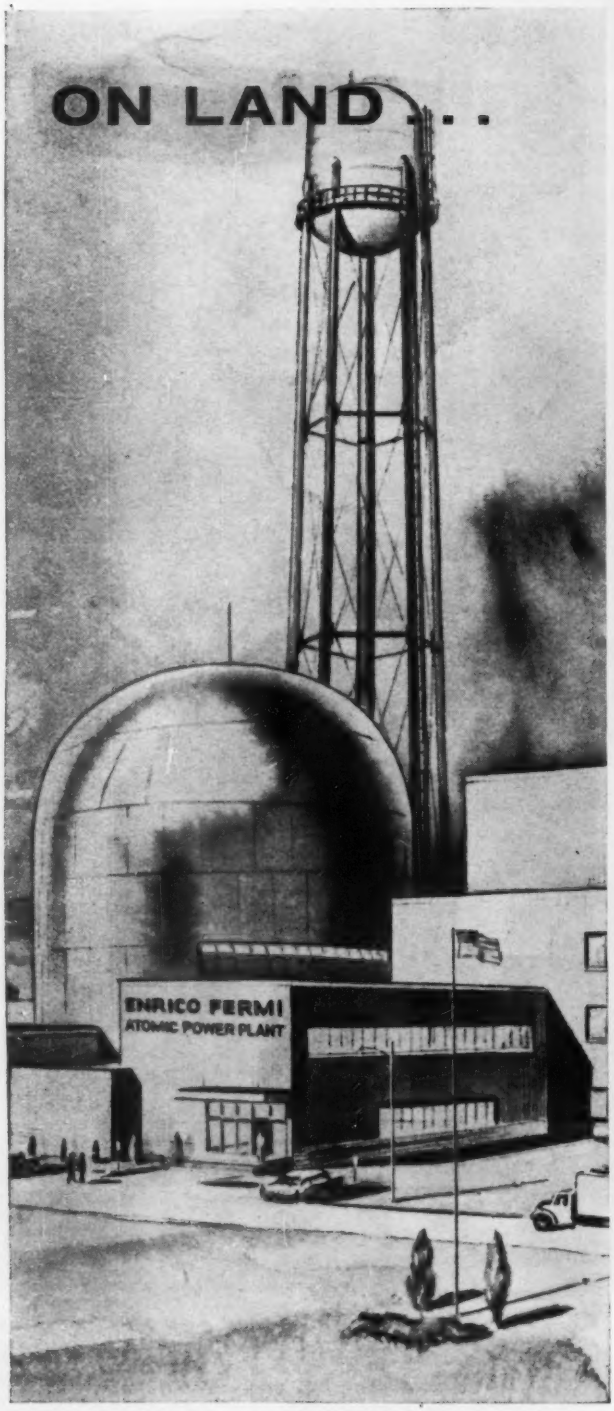
Equipment automatically measures the core loss and exciting current of each transformer.

SOUND TEST

The audible sound level of every transformer is measured while the unit has normal excitation voltage applied.

CSP BREAKER TEST

When applicable signal light and breaker operation is checked under overload conditions for proper operation.

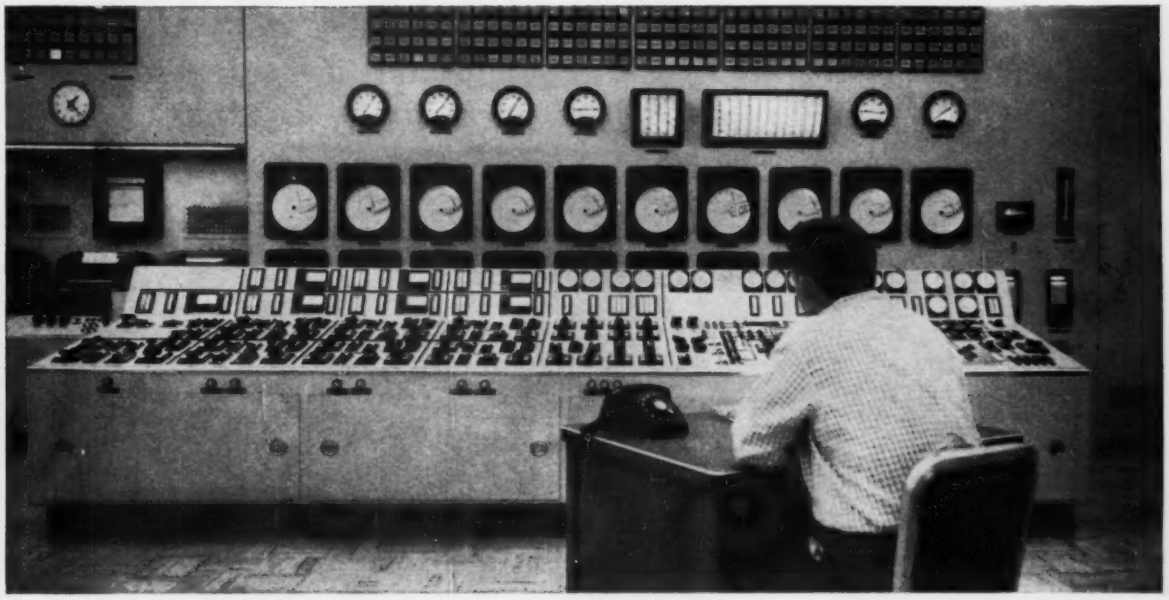


At the Enrico Fermi Atomic Power Plant, instruments and controls for both the "fast neutron breeder" reactor and the steam plant which it will "fire" are being furnished by Bailey.

Many of the new ships such as this super-carrier, USS Ranger, operate their boilers by Bailey Meter Control. Cargo ships, tankers, and passenger liners as well as Naval ships improve the economy and safety of their steam plants thru use of Bailey controls.

At the Thomas H. Allen Electric Generating Station of the City of Memphis, Tenn., Bailey operating indicators and controls for combustion, feed water, and steam temperature are centralized on the mechanical bench-board directly ahead, while the operating records which reflect trends are mounted on the vertical boards. A Bailey METROTYPE Information System, center left in the photo, scans, monitors, and logs functions usually assigned to strip-chart recorders.

IT'S BAILEY. . .



for the latest and safest instruments and controls for nuclear and conventional power plants!

Many of the power plants of the future will have controls and instruments designed and built by Bailey. There are two reasons: Bailey's continuing research and development toward the latest equipment for industry's needs; Bailey's 40-year association with the hardware and economic requirements of the industry.

If you are planning new or improved power plant facilities, call on Bailey engineers to assure that your system will have the *proper balance both as to economics and needs . . . that there will not be the unnecessary expense of over-instrumentation or control . . . nor the duplication of equipment functions.*

Call on Bailey for primary sensing devices, indicators, loggers, control units, panels, data handling equipment, computers for performance analysis, and supervisory controls. You'll find designs ranging from conventional to the most sophisticated . . . mechanical, pneumatic, electric and electronic, including solid state.

There's a Bailey District Office or Resident Engineer close to you. Check your phone book, or write direct.

A144-2

Instruments and controls for power and process

BAILEY METER COMPANY

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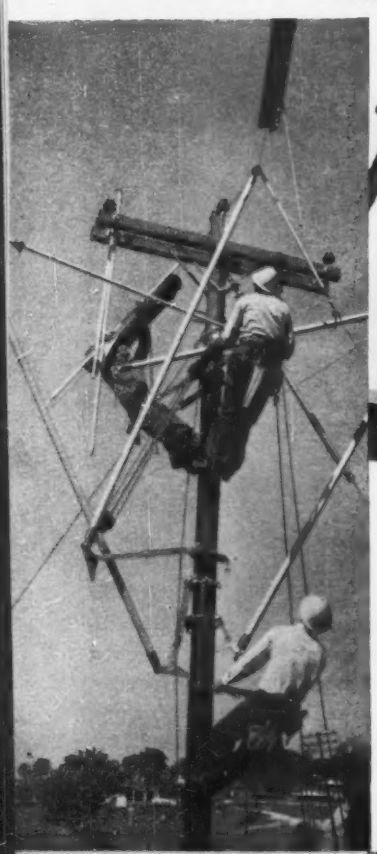
In Canada—Bailey Meter Company Limited, Montreal

Kearney Hot Line Tool Demonstrators offer line crews new ideas and methods to...

SAVE MAN-HOURS...PREVENT ACCIDENTS...

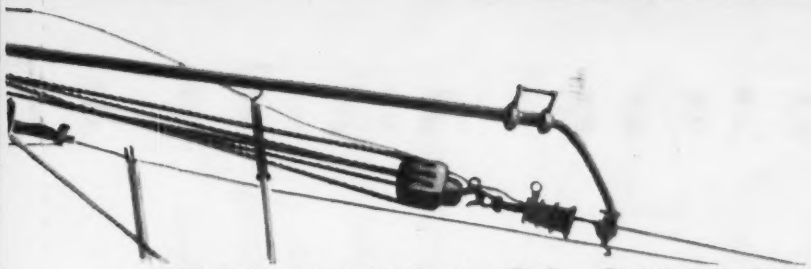


"IF YOU CAN INSTALL IT COLD... YOU CAN INSTALL IT HOT!"

Kearney Hot Line Tool Demonstrators prove the truth of the above statement day after day . . . by demonstration on actual live-line maintenance jobs. Through such demonstrations line crews learn proper safety procedures and time-saving, cost-cutting methods to make their job of maintaining energized lines easier and safer.

"On the job" demonstrations help solve spot problems and introduce new methods to line crews which can be used to advantage over and over again . . . to reduce costs, insure reliable operation and improve safety standards.

"We teach something, we learn something . . . everytime out"... says Clete Brewer, Chief of Kearney Demonstrators. This sums up the attitude of Kearney men in the field, explains why they are well-regarded by line crews everywhere.



. . . . STOP NEEDLESS OUTAGES

Even experienced line crews can benefit from the specialized knowledge of Kearney Hot Line Tool Demonstrators. Their background and experience in all phases of rigging, hot line maintenance, and compression connector installation techniques fully qualifies them to assist in training line crews in improved methods to shorten installation time . . . prevent costly de-energizing of lines . . . and improve safety conditions.

Kearney Hot Line Tool Demonstrators . . . are your only single source of complete information on compression connector installation and hot-line maintenance techniques!

Kearney . . . and only Kearney . . . manufactures both a complete line of hot stick tools **and** a complete line of compression connectors, tools and dies. The completeness of these two lines is part of Kearney's planned program to provide power companies with a fully integrated selection of equipment to safely accomplish any phase of hot line work . . . without interruption of circuit continuity or service to customers.

If you would like to arrange for Kearney Demonstrator Service consult your Kearney Sales Representative. Adequate advance notice is necessary, of course, to permit proper planning and scheduling.

KEARNEY

JAMES R. KEARNEY CORPORATION

4224-42 Clayton Avenue • St. Louis 10, Missouri

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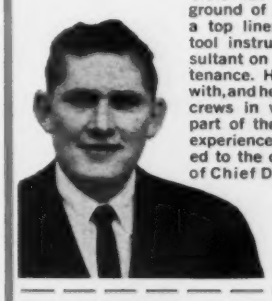
513

Hot stick schools conducted by Kearney Hot Line Tool Demonstrators keep linemen up to date on new installation and maintenance methods . . . new tools and equipment . . . new rigging techniques . . . and new ideas being used to advantage by line crews in other areas.

Chief Demonstrator Clete Brewer and his staff...

. . . cover the country. Kearney Demonstrators are available for help in training line crews or for consultation relating to specific job problems anywhere in the U. S. Each man is a well-qualified veteran with many years of past experience as a top lineman.

Chief Demonstrator Clete Brewer



Clete has a wide background of experience as a top lineman, hot line tool instructor and consultant on hot line maintenance. He has worked with, and helped train, line crews in virtually every part of the country. His experience is ideally suited to the demanding job of Chief Demonstrator.

CARL JONES

DICK TASKER

JIM MONARSKI

BOB DALE

BERT ROSE

"WHITEY" KOHLER

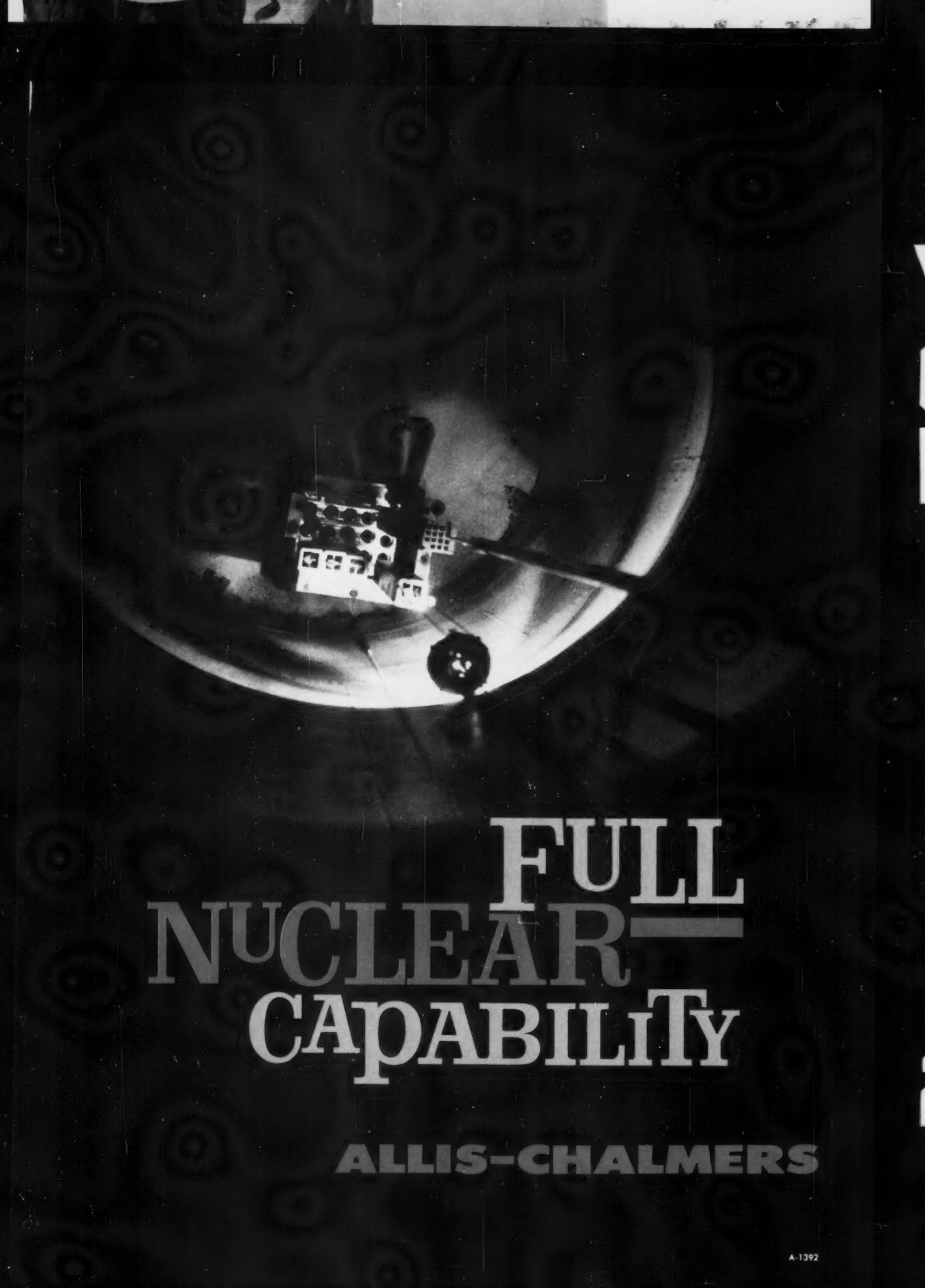
VERSATILE

REYNOLDS 5005

high strength, all-aluminum conductor

Reynolds 5005 aluminum alloy conductor is ideal for many overhead cable applications. It is excellent as the neutral messenger in triplex, provides low cost installations on distribution lines, and is adaptable for many high voltage lines. In addition, it is especially attractive for reconductoring, and can be used in special cable constructions. Reynolds 5005 is light in weight—stringing and handling costs are reduced. Since there is no steel core, splicing is easier, and there is no possibility of galvanic corrosion. Minimum guaranteed conductivity 53.5%. Complete data available from your nearest Reynolds branch office, Reynolds Electrical Distributor, or *Reynolds Metals Company, P.O. Box 2346-EL, Richmond 18, Virginia.*

Watch Reynolds TV show "Harrigan & Son", Fridays, ABC-TV


FULL
NUCLEAR
CAPABILITY
ALLIS-CHALMERS
A-1392

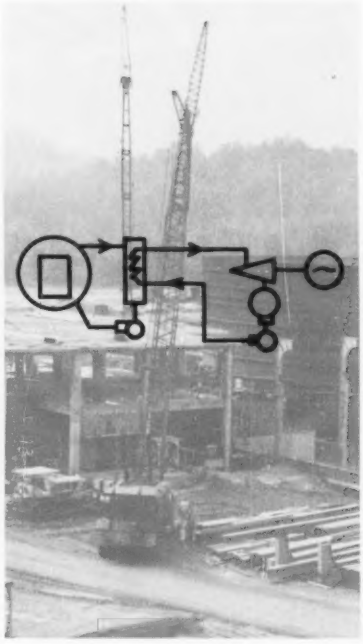
Experienced in power, research and training reactors

SEVEN FIRST HAND REPORTS

Full nuclear capability . . . in all phases of design, construction and operation. These are the goals which Allis-Chalmers set a short five years ago. Today they are accomplished facts.

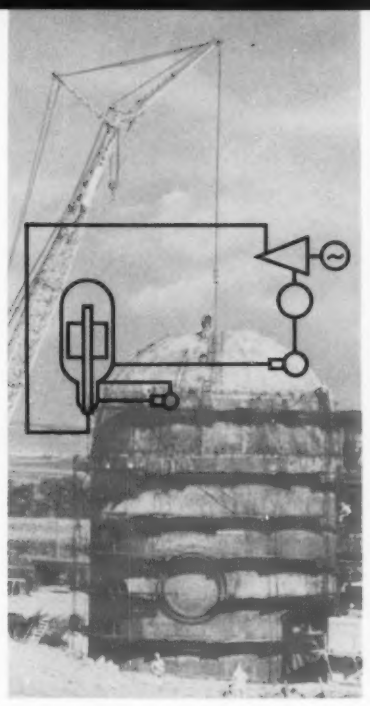
Only Allis-Chalmers has experience in both direct- and indirect-cycle boiling water reactors, fast breeder, gas-cooled, and pressurized-water reactors. A-C scientists and engineers believe that the knowledge and experience gained from these projects and others, such as the C-Stellarator project, will be an important contribution toward competitive nuclear power.

With nearly a century of experience in all areas of power production, it is only natural that A-C is a leader in the fast-paced fields of atomic energy. Whatever your plans in the field of atomic energy, you should investigate what Allis-Chalmers can do toward serving your needs. You may well be interested in receiving the new booklet "Atomic Energy at Allis-Chalmers." Write or wire for your free copy. Atomic Energy Division, **Allis-Chalmers,** Milwaukee 1, Wisconsin.

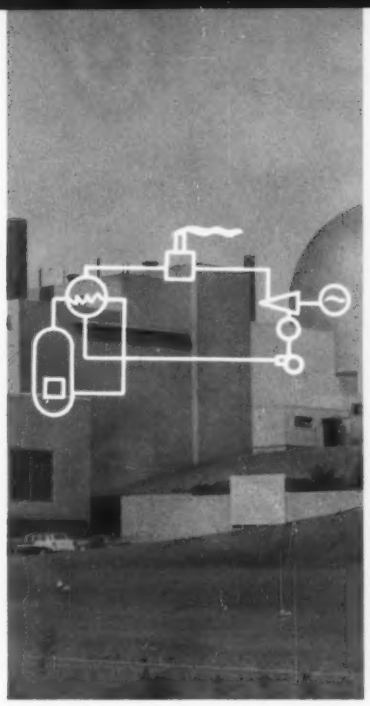


"GAS COOLED

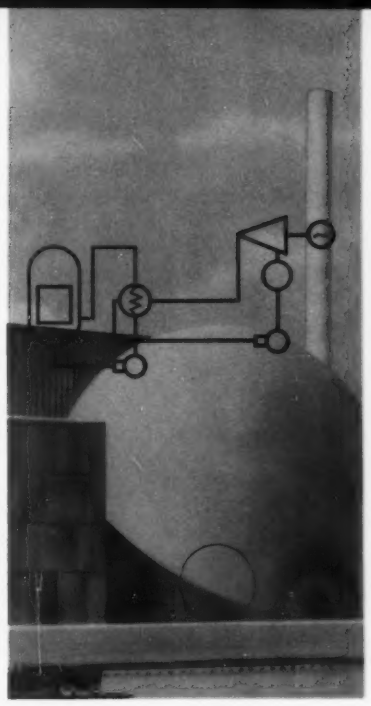
The first U. S. gas-cooled nuclear plant, this experimental reactor for Oak Ridge is rated at 85,000 kwt. We performed the conceptual and final design and detailed engineering on this helium-cooled, graphite-moderated reactor."



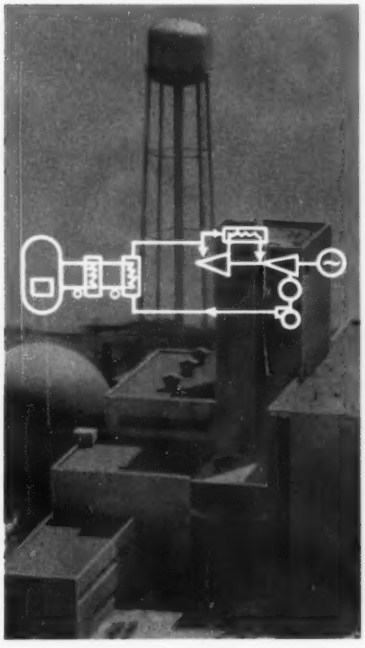
"BOILING WATER We have the responsibility for design, engineering, fabrication and construction of the Pathfinder Power Station. Of the direct-cycle type, this 66,000-kwe boiling water reactor is the first power reactor with integral nuclear superheat. "



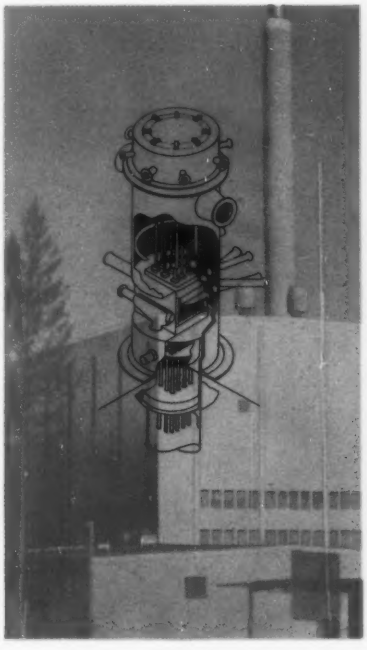
"BOILING WATER Allis-Chalmers is also experienced in indirect-cycle-type boiling water reactors. The A-C 22,000-kwe reactor for the RCPA of Elk River, Minn., incorporates a conventional fuel fired superheater and is the AEC's second-round power demonstration."



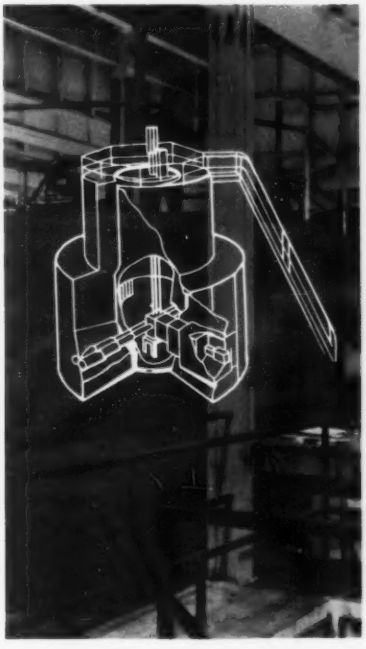
"PRESSURIZED WATER Resulting from an Atomic Energy Commission contract award, Allis-Chalmers has performed the nuclear design work on a 40,000-kwt pressurized-water reactor system for experimental low-temperature process heating applications. "



"FAST BREEDER As a member of APDA and of PRDC, Allis-Chalmers has participated in the design of the 300,000-kwt Enrico Fermi reactor and is furnishing reactor and system components, including the turbine-generator. "



"RESEARCH AND TEST In many countries throughout the world Allis-Chalmers research and test reactors are now in operation or under construction. These reactors range in size from 1,000 to 30,000 kw. "



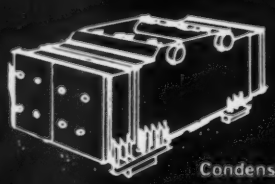
"TRAINING We offer a variety of training reactors with operating power levels from 1 kw to 1,000 kw. These reactors require neither a containment shell nor special utilities. They may be erected in ordinary buildings. "

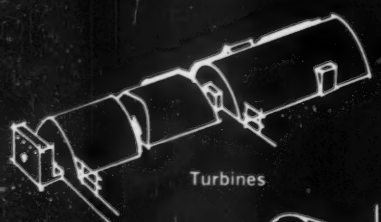
COMPLETE SYSTEMS RESPONSIBILITY

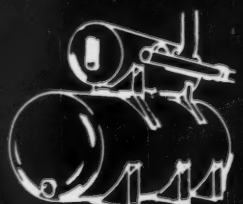
From the "talk-about-it" stages through to the start-up and operation of a complete nuclear facility, Allis-Chalmers provides a rare balance of technology, experience and component manufacture. Long a leader in the power generation field, Allis-Chalmers offers thorough knowledge and a wide range of products for any system: Turbines, condensers, pumps, valves, water conditioning systems, transformers, circuit breakers, switchgear, electrical control and regulating equipment... and also nuclear reactors of all types, plus special development projects into new methods of energy conversion, such as thermonuclear fusion, magnetohydrodynamics and the fuel cell.

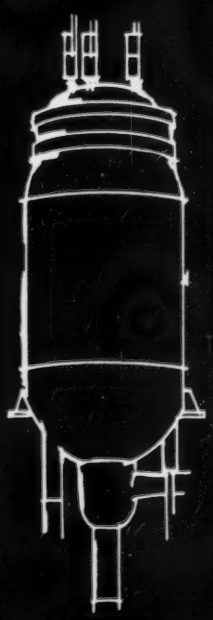
PROFESSIONAL OPPORTUNITIES:
Would you like to work with Allis-Chalmers highly qualified atomic scientists and engineers? . . . *Write to* **Allis-Chalmers,** *Atomic Energy Division, Milwaukee 1, Wisconsin, for information on employment opportunities.*

A-C **ALLIS-CHALMERS**

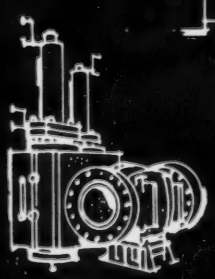

Condensers

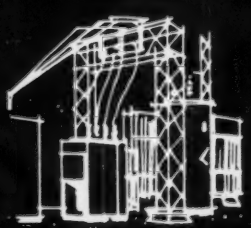

Turbines


Water conditioning systems


Reactors

Pumps


Valves


Complete electrical equipment

LITHO IN USA 0&1 61

Editorial Comment

MAY 22, 1961

Has AEC Caution Inhibited the Atomic Program?

In the early days of the atomic program, the AEC gave an enthusiastic go-ahead to plant construction, although comparatively little was known about the parameters of those plants. Now the art is far better understood, as the report on page 67 attests. Two commercial plants are operating and controls, including safety and safety back-up devices, have improved in sophistication and reliability. Yet, paradoxically, with these advances in understanding has come an increased chariness by the regulatory side of the Commission about reactor siting and reactor design. For prospective builders, the resulting uncertainties have left only the certainties of closer control, more trips to Washington and costs increased over estimates. The effect on the desire to build is obvious.

A second effect is less so. Prospective builders want to see what operating experience will produce. But regulatory decisions, like the one on 17-4 PH stainless steel for Elk River, have been among the causes for delaying startups to get operating experience.

Two recent efforts may encourage more starts. The Commission has instituted an interim change in its regulatory organization. There is a strong chance that it will effect a permanent change. And this month, AEC Chairman Glenn Seaborg talked of the possibility of "still more incentives" in financial form.

The keenest incentive of all would be an AEC outlook on siting and reactor design that keeps pace with technical development.

NBS High Voltage Laboratory Should Not Be Abandoned

With power industry interest in higher voltages at peak levels today, it's utterly inconceivable that one of the nation's renowned high-voltage laboratories can face abandonment because of disuse. Yet it's a fact! Unless sufficient industry need for its services can be demonstrated, the high-voltage laboratory of the National Bureau of Standards is threatened with abandonment when the Bureau moves to new quarters at Gaithersburg, Md.

This laboratory has been used chiefly for precision measurement of high dc and ac voltages and power factor. Although it has done excellent work in high-voltage impulse measurement and is famous for its high-voltage dc facilities, the laboratory hasn't been used to full capacity. This is largely due to lack of demand from industry.

Besides this, Bureau personnel have been aware for some time of a need to extend the range of accurate measurement facilities to still higher voltages. But in the absence of encouragement and support, they have been unable to devote time and effort to it.

Faced with the prospect of moving the high-voltage laboratory to Gaithersburg and investing in housing facilities there, the Bureau reasoned that a laboratory that couldn't justify an increase in its voltage range in the face of industry-wide interest in higher voltage probably would not be able to meet industry needs anyway. Thus they concluded that conditions didn't justify moving the laboratory. Since it can't stay where it is, abandonment looms.

This decision is tentative. The ultimate decision will be guided by recommendations of an *ad hoc* advisory committee picked by the National Research Council and headed by Dr J. T. Lusignan to consider national needs for a high-voltage laboratory, decide upon its activities, and pick an appropriate range of voltages.

It's to be hoped that both individuals and industry organizations will convey to Dr Lusignan and his committee the continuing need for an active high-voltage laboratory to uphold standards of measurement as the industry moves ahead to explore the newer voltages.

Clapp Plans Loans for Machinery,

"$100 million not for electric funds"

"Last percentages are hardest"

"Dual rates a general pattern"

Rural Electrification Administrator Norman Clapp plans to promote the use of REA loans for rural industries to install power-consuming machinery, under REA's existing authority to make appliance (Section 5) loans. And Clapp also says he will scrutinize contracts between co-ops and wholesale power suppliers as a possible basis for authorizing generation and transmission loans.

These are two of the highlights of an exclusive interview for *Electrical World*. The interview is as follows:

Question—How will you give assistance to the economic development of rural areas?

Clapp—Well, you'll have to differentiate between the specific problem of designated, depressed rural areas and rural economic development in general. Let's take depressed areas first. We're awaiting the outcome of an agreement between the Secretaries of Commerce and Agriculture and the new Depressed Areas Administrator, William Batt, whereby REA probably will be authorized as the distributing agency for $100 million in loan funds recently authorized by Congress (S-1) to rural areas, plus a portion of the $75 million in direct grants for public facilities also authorized by S-1.

Question—Would you make these loans, or grants, under the depressed areas program, just to qualifying REA electric and telephone borrowers, or to anyone qualifying under the terms of the new law, S-1?

Clapp—We'd make loans to anyone in rural areas who qualified under the new program, not just to our electric or telephone borrowers.

Question—Will any of the $100 million in loans, or the public facilities funds, be used for power facilities?

Clapp—I doubt it. Oh, I can conceive of a situation where one of the problems in a designated rural depressed area could be laid to inadequate power facilities and we could lend money to improve this. This isn't very likely, though. If any of this money does go for power facilities, it will be very small. The $100 million won't be used as an addition to REA electric loan funds.

Question—What about your plans for rural development in general, aside from depressed areas?

Clapp—I imagine we will promote this through two existing REA programs: The use of appliance (Section 5) loans for co-ops to relend to new industries for installation of power-consuming machinery; and through a stepped-up power-use promotion program aimed at industrial development.

Question—The traditional use of these appliance loans has been only a minor fraction of REA's total loan program (only 1%), and their use for industrial machinery could be a significant jump in this loan area. Have you estimated the market for industrial machinery loans?

Clapp—Not yet. It's too early to tell.

Question—What type of rural industrial development do you foresee in either the specific depressed areas or for rural areas in general?

Clapp — Mostly food-processing plants. That seems to be what's needed mostly in depressed areas. These put local people to work using locally produced crops. And we want the local people to establish their own 'home grown' industries as they see the needs. We aren't out to lure urban industries to relocate in rural areas. That wouldn't be a gain for the country as a whole.

Question—You don't plan to sponsor any nationwide promotion program that would tend to stimulate rural areas to urge urban industries to move outside the cities?

Clapp—This isn't a rural-vs-urban problem. What we have in mind is a net gain in industrial development in this country. We want to restore the economic parity between rural and urban areas. At present, there's a serious disparity between living standards and economic opportunity in the two areas. We want to encourage electric co-ops to stimulate new enterprise in their areas.

Question—There is still about 3% of the nation's rural area unconnected with central power stations. Do you plan to push the closing of this gap as part of your rural development program?

Clapp—The last percentages are always the hardest, you know. We

won't be satisfied until we have 100% rural electrification, but this won't be a specific part of our industrial development plans.

Question—Turning to a different subject, you have said recently, on several occasions, that REA will consider a new criterion for approving generating and transmission loans: namely, whether such loans are necessary simply to keep the systems in existence. (Other criteria are availability and adequacy of wholesale power from other sources, and reasonably low cost of this power.) What is your purpose in adding this new criterion?

Clapp—We want to preserve the integrity of the co-op distribution systems, so, as a practical matter, we want to make sure that power is available to co-ops on a basis otherwise than the troublesome terms—frequently including dual rates—that co-ops sometimes are forced to accept in buying power.

Question—You have referred several times recently to unfair wholesale rate contracts. Can you comment more fully on this?

Clapp—Well, yes. Dual rates are a pretty general pattern across the country. We want co-ops to be able to develop industrial loads, but some of their wholesale power contracts don't give them the right—I should say don't give them the right to any financial advantage—of serving industrial customers in their areas. These contracts usually have restrictions which include dual rates, short terms, fuel clauses and even —this is ridiculous—rates tied to commodity index clauses. The escalator clauses always go up, never down. Co-ops ought to be entitled to firm industrial wholesale rates in their supply contracts.

Question—So, when you talk of this new criterion, you are thinking principally of power contracts?

Clapp—Yes.

Question—Well, if these contracts don't make power available on adequate enough, or on long enough terms, or at low enough rates, aren't you really just repeating the original criteria for determining the need for G&T loans? That is, adequacy, availability and reasonable cost.

Clapp—No, not really. Those terms have come to be thought of more or less on an engineering basis. We're thinking now of contract provisions.

"Co-ops should be entitled to firm industrial wholesale rates"

Question—You mean legal considerations?

Clapp—Yes.

Question—In other words, a co-op might be eligible for a G&T loan on the principal ground that it has wholesale power available only on these 'unfair' terms? The co-op would send a copy of its contract to REA, and your legal staff would decide it wasn't fair.

Clapp—More or less, yes.

Question—President Kennedy's nominee for the Federal Power Commission, Joseph Swidler, has testified before the Senate Commerce Committee that he opposes the 'freezing' of any ownership patterns (public and investor-owned) in the nation's power systems. Aren't you suggesting the opposite —freezing the co-op system?

Clapp—I believe the rural co-op system is a unique and distinct middle road between public power on the one hand and the commercial power systems on the other. I believe it has a permanent place in the American economy.

Question—In some cases, the maintenance of a co-op power system, as against some other form of ownership, might result in less efficient power, couldn't it?

Clapp—I believe in the basic efficiency of the co-op system. Properly protected, co-ops can compete as efficiently as any other system. The federal government has a big investment in the rural electrification program, and this should be protected.

Question—What do you consider the principal problems facing REA and the co-op systems today?

Clapp—I'd say there are two. The first is preserving the territorial integrity of the systems, both from annexation problems caused by adjoining cities and from restrictions which prevent co-ops from serving industries within their territories. The second is in obtaining and keeping an adequate power supply.

Question—When you mention power supply problems, are you speaking of something broader than the wholesale contract issue we have discussed? I notice that some of your borrowers have complained of supply shortages at federal plants in the Missouri River Basin.

Clapp—Well, it comes back pretty much to contracts. In most areas, co-ops have to fall back on commercial companies to cover all their needs.

Question—Do you feel you are winning or losing the battle for territorial safeguards?

Clapp—I'd say we were turning the tide in our direction.

Question—Aren't these problems mostly at a state level?

Clapp—Well, yes, they are.

Question—Are you still promoting the sales of the 2% REA bonds, initiated last July by your predecessor, David Hamil, and do you regard them as highly as he did?

Clapp—Yes. We've hit a new record in sales—$17 million total. We often make a sale right here in this office when co-op leaders come in to visit. The bonds are excellent. They fill a co-op investment need.

Co-op Group Plans 400-Mw

Basin Electric Power Co-op wants $144-million REA loan; possible conflict with plans of Lignite group foreseen

Intention to build at least 400 Mw of generating capacity plus transmission lines for 345-kv operation by a federation of 15 rural electric cooperatives in five North Central states was announced with the incorporation of Basin Electric Power Cooperative Assn in Bismarck, N. D., on May 5. To implement these plans, Basin Electric will apply to Rural Electrification Administration for a loan of $144,773,000, including about $25 million for transmission facilities.

With this loan, the largest ever asked from REA, the association would build 200 Mw of capacity at a site on the Missouri River near Stanton, N. D., for operation in 1965 to meet expected increased power needs of 179 Mw. A short 230-kv transmission tie to nearby facilities of the US Bureau of Reclamation would be required for this initial plant. An additional 200 Mw of capacity would be built for operation in 1968-69 either at the Stanton site or other locations.

The association consists of ten G&T cooperatives and five distribution cooperatives serving 277,500 rural and urban customers in North and South Dakota, Minnesota, Iowa and Montana. According to a study made by R. W. Beck & Associates, Seattle, an expected increase in power needs of the federation will total 661 Mw by 1975. Thus Basin Electric plans additional generation of 200 Mw by 1973. A separate loan from REA would be necessary for this last 200 Mw of capacity.

MP&L Makes Proposals

Referring to Basin Electric at MP&L's annual meeting in Duluth on May 9, Clay C. Boswell, president of Minnesota Power & Light Co, said that ten distribution cooperatives served by the company "are also considering obtaining their future power supply from large super-cooperatives in the Dakotas . . . To deliver power to our co-ops would require large additional expenditures for high voltage transmission and subtransmission lines."

Thus, Boswell revealed two proposals made to the cooperatives:

1. Extension of present power contracts, most of which expire in 1963, to Dec. 31, 1966. Present MP&L capacity is sufficient to serve the co-ops until 1966.

2. Construction by the co-ops of an REA-financed power plant (100 or 150 Mw) in the MP&L service area to be on the line by Dec. 31, 1966. MP&L would integrate this plant and operate it as part of its system, paying all fixed charges and operating costs, and deliver power from it to the co-ops at cost. Excess capability of the plant would be available to MP&L until needed by the co-ops.

Three Plans Submitted

Three plans have been submitted to Basin Electric by Beck & Associates for the location of its three generating stations. All three plans would locate the first 200-Mw plant in the Stanton area to utilize the large lignite reserves available locally. Plan "A" would locate all plants (600 Mw) at Stanton, with the first 200-Mw unit to be on the line in 1965 followed by 200-Mw units in 1969 and 1973. Concentration of the generation at Stanton would require transmission at 345 kv from Bismarck to Sioux City, Iowa, and to Granite Falls, Minn., *Electrical World* learned.

Plan "B" calls for additional units to be located at Sioux City by 1969 and at Big Stone City, S. D., by 1973. The initial plant at Stanton by 1965, a 150-Mw unit in 1969 at Mobridge, S. D., and a 200-Mw unit at Sioux City by 1972 are included under plan "C."

A Basin Electric report proposes the following:

1. Basin Electric would agree to supply the total output of two 100-Mw steam units to USBR for its use in taking care of preference customers, with the Bureau to be the marketing agent on an "if, as and when" basis.

2. Basin Electric would maintain only a working capital and an emergency reserve fund; charge no depreciation against power costs; and agree not to drop capacity charge at the end of the REA loan period.

3. The Bureau would agree to buy the total capacity of the plant at $6.50 per kw-year (amortization charges); and would agree to buy the energy at cost from Basin Electric, which cost would include taxes, labor, operations and maintenance. When the last amortization payment has been made to REA, capacity of the steam plant would be given free of charge to the Bureau. Energy charges would remain the same.

4. Basin Electric would operate the plant.

5. During this short-term period Basin Electric would work and plan with the Bureau and the Midwest Electric Consumers Assn, in completing an optimum hydro-thermal transmission system.

Approval by REA of the $114-million loan planned by Basin Electric may hinge on action that will be taken on an application for a $44-million loan by Lignite Electric Power Cooperative, Inc, which also intends to build a 200-Mw initial capacity station near Stanton. Lignite Electric, including Central Power Electric Co-op, Dakotas Electric Co-op, and Minnkota Power Co-op, is working with Otter Tail Power and Northern States Power to implement the recommendations of the North Dakota Area Power Study (EW, Jan. 2, p 24) calling for 1,250 Mw of new capacity over the next 18 years.

Jones: No Conflict

According to Arthur Jones, Britton, S. D., president of Basin Electric and chairman of East River Electric Power Co-op, plans of the association are not in conflict with those of Lignite Electric. If REA sees a need for both organizations it might grant both loans.

In a statement of intent (EW, Feb. 27, p 131) signed jointly with the two investor-owned systems, Lignite Electric points out that other power suppliers in the area are welcome to join their venture. Andrew L. Freeman, manager of Minnkota

Thermal Capacity in Midwest

Power, speaking for Lignite Electric, told *Electrical World,* "There is room for cooperation between the two groups, and we seek such cooperation."

Freeman also said the Lignite Electric group serves about 100,000 rural customers in almost all of North Dakota and parts of Minnesota and South Dakota. In the area involved in the study, Otter Tail Power and Northern States Power serve 150,000 urban customers. In addition, there are other power suppliers in North Dakota and Montana not in Lignite Electric who could profit by joining, Freeman pointed out.

The ten G&T co-ops in Basin Electric are: Upper Missouri G&T Electric in Montana; Northern Minnesota Power Assn and Rural Cooperative Power Assn in Minnesota; East River Electric Power and Rushmore G&T Electric in South Dakota; and Central Iowa Power, Corn Belt Power, L&O Cooperative, Southwestern Federated Power, and Northwest Iowa Power in Iowa. Distribution co-ops include K. E. M. Electric and Verendrye Electric in North Dakota; Minnesota Valley Cooperative L&P Assn; and Cherry-Todd Electric and Moreau-Grand Electric in South Dakota.

Engineering Studies on Libby Dam Begin

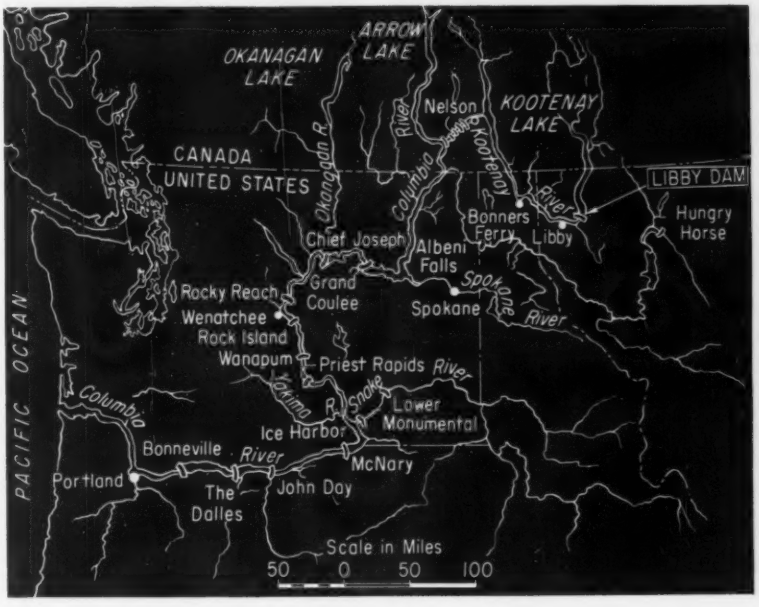
Full-scale engineering studies started on the Libby Dam project when survey teams, drilling equipment and engineers were sent into the area by the US Army Engineer District, Seattle. About 30 men are in the field now.

Col R. P. Young, district engineer, announced the action following receipt of funds contained in the Fiscal Year 1961 Supplemental Appropriation Bill of the Congress for reactivation of engineering studies on Libby Dam on the Kootenai River in northern Montana, about 15 miles upstream from Libby.

Although the project was authorized for construction in 1950, work on the dam has been stalled by a lack of agreement with Canada for flooding of land in that country. The recent US-Canadian Treaty, which has been ratified by the US Senate and is awaiting ratification by Canada, provides for cooperative development of water resources of the Columbia River Basin and contains enabling authority for construction of Libby Dam.

Libby Dam is a key project of the United States' plan for water-resource development of the Columbia River Basin. The dam will be a 400-ft-high structure and will have a gross storage capacity of six million acre-ft. The dam will create a reservoir extending 95 miles upstream, of which 42 will be in Canada.

The project will provide five million acre-ft of usable storage for downstream flood protection and power generation. It will afford almost complete flood protection for the Kootenai Valley in Montana, Idaho and British Columbia, downstream from the dam, including about 34,000 acres of fertile valley lands in the US portion and 17,500 acres in the Canadian portion of the Kootenai Flats area.



Five Canadian dams on the Kootenai River downstream of Libby and the US dams on the Columbia will be able to generate substantial quantities of additional power with water releases from Libby Dam reservoir storage.

During the last 13 years, floods in the US portion of the Kootenai Valley, alone, caused damages amounting to about $16 million, which could have been prevented if Libby Dam had been in operation, the district engineer said. This project's flood storage, in conjunction with future Canadian storage, also will be a major element in controlling floods to safe limits on the lower Columbia River below Pasco, Wash.

The Libby project will have an initial installation of four 86-Mw generators. An estimated 472 Mw of prime power will be added to Northwest power resources by at-site generation and by generation of additional power at downstream plants with releases from Libby.

- **Nuclear experts expect little technological benefit from Hanford**
- **Most of those polled feel money should be spent on other projects**
- **Those in favor cite operating experience as worthwhile to science**

Experts Cool on Hanford A-Plant

A number of top nuclear experts believe the $95 million to be spent for generating equipment for the Hanford New Production Reactor (NPR) is a misuse of government money.

The experts say no significant technical contribution to reactor development may be expected from either the huge generator expenditure or the $25 million included in the separate $145-million reactor cost for features permitting electricity generation. The 760-Mw reactor will also produce plutonium for the first ten years of its 35-year lifetime.

Poll Covers 25 Nuclear Experts

Twenty-five nuclear experts in industry and at universities were polled by Rep Craig Hosmer (R-Calif.). Hosmer said in an interview on his NPR survey that he plans to oppose the $95-million item for generators. The generators are included in the Atomic Energy Commission's fiscal 1962 construction budget. It is expected to come up for final vote in the House later this month.

Hosmer asked in the poll:

1. Do you believe that conversion of the NPR to power production will make any significant contribution to the advancement of civilian power reactor technology in this country?

2. In your judgment, is the allocation of $95 million to conversion of the Hanford reactor the most fruitful investment that could be made in terms of developing uses of atomic energy? Could these funds be used more advantageously for such projects as fuel element research and development, further development of promising civilian power reactor types, research on test reactor development or radioisotope research, to mention just a few possibilities?

Some 'Hedging' Is in Replies

Hosmer said most of the experts had replied by last week. He promised that names of individuals and their particular replies would be held confidential. Hosmer said, however, that there was an "understandable degree of hedging" in the replies.

But two-thirds of the experts, according to Hosmer's analysis of the results, saw no substantial contributions to civilian reactor technology flowing from converting of the plutonium-making reactor to a dual-purpose power facility.

About 85% of those replying to the poll believed nuclear technology could be better advanced by spending the $95 million—or a lesser amount—on a variety of other projects.

A Few Favor Hanford Generation

Some replies in the Hosmer poll cited reasons why substantial contributions would be made by addition of electrical generators to the Hanford reactor. Pro-NPR conversion replies cited turbine knowledge that would be gained, operating experience with big atomic plants and knowledge that could be gained from Zircaloy pressure tubes and Zircaloy-clad uranium fuel.

Replies against conversion cited, as typical reasons, the following: turbine knowledge is of no interest to reactor technology, the information gained will duplicate that already available from other water reactors, operating experience will not be relevant to that needed for non-dual-purpose central station nuclear power plants, and what information developed would be so cloaked in military secrecy that it would never be disseminated commercially anyway.

As examples of replies not strictly technical, many answers cited the requirements for the Northwest power market. For example, "The power is not needed there," several parties said. Others said some use of the NPR dump heat should be made—"But this may or may not be the best way to do it."

Suggested ways of how the $95 million could better be spent, as stated by Hosmer in the boiled-down results of the survey, were support for a full line of military reactors, intensified materials research, radioactive wastes disposal, radioisotopes research, promotion of advanced reactor concepts, etc.

One reply said half the NPR money would have resulted in more nuclear electrical capacity than Hanford's 760 Mw. Another said the same money would have brought three 330-Mw central station atomic plants on line by early 1965.

Should Bonneville Pay for Plant?

"What worried me is I'm not now convinced this $95 million has anything to do with nuclear power," said Hosmer. "Bonneville Power Administration in that case should pay for the facilities to increase its system," he said. "I have grave doubts on the quality of the steam to come from the reactor. I doubt there will be steam generating equipment that will be able to work it," the Joint Committee on Atomic Energy member said. Hosmer felt it would be wiser to wait until 1963 after the NPR fuel elements are tested before approving the $95-million generator money. "We may have to leave the equipment setting there unusable if it's approved this year," he said.

Hosmer plans to use the results in his fight to head off approval of the NPR generators. A House vote is to come later this month.

EW Schedules Fifth Electric Heating Meeting

Electrical World has scheduled its Fifth Electric Heating Conference for September 25 and 26, 1961, at the Sheraton-Park Hotel, Washington, D. C.

Details of the meeting can be secured from: John D. Damon, *Electrical World*, 330 West 42nd St, New York 36, N. Y.

Switches on Single Pole Aid 115-Kv Construction

E. C. AVERY, Project Coordinating Engineer, Puget Sound Power & Light Co, Bellevue, Wash.

Group operated single-pole 115-kv air break switches mounted on a single wood pole are used by Puget Sound Power & Light Co to facilitate use of 115-kv subtransmission. By eliminating the need for multi-pole station structures, the single-pole design is adaptable to city streets and has been favorably received by the public. The preferred "zig-zag" design was picked after comparison with a "triangle" design.

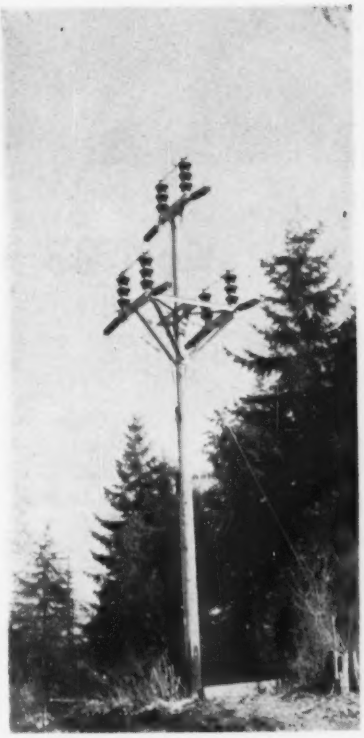
Puget Power decided to use 115 kv for subtransmission to provide the increased capacity needed to supply future loads and to eliminate the cost of 115 to 55-kv transformation. However, mounting restrictions on city streets were troublesome until a suitable single-pole design became available.

The "triangle" and the "zig-zag" designs were developed after discussion with manufacturers. Side opening was used to save pole height and switching weight.

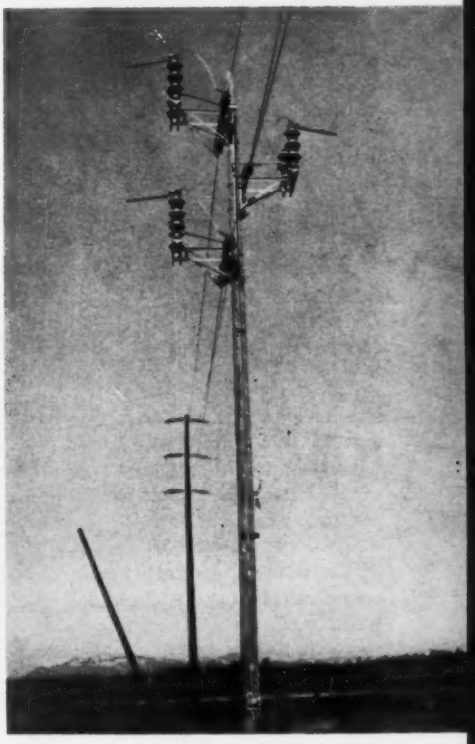
Two situations arose where five switches could be used to advantage. Three 600-amp and two 1,200-amp switches were ordered for field testing before selection of a design.

All switches were ordered with arc restrictors so that the switches could successfully open line charging currents. The two installations were similar in that each had five miles of line on one side of the switch and 15 miles on the other. Tests showed that well designed and installed arc restrictors successfully handled the 15-mile section.

The arc restrictors on two switches gave considerable trouble which was successfully resolved by proper changes. Slow motion pictures were taken both before and after the changes. This permitted observation of arc cycling and mechanical motion. It was apparent that arc restrictor design is very important and, in some cases, not too well understood.



TRIANGLE ARRANGEMENT has massive appearance, other bad features



ZIG-ZAG ARRANGEMENT is cleaner, more easily adaptable in field

Tests were quite simple. No instrumentation was used—just visual inspection of whether the switch opened without undue arcing, plus motion pictures when initial observations indicated adjustments were necessary.

An attempt was made to reduce overhang of the "zig-zag" switch in triangle formation by moving the switch closer to the pole.

A blade curvature provided adequate pole clearance, but further study indicated that phase-to-phase clearance could prove inadequate and the design was discarded.

Rotating control rods were approved for use with reciprocating spade type handles connected to the rods through 2:1 gear ratio boxes. These gear boxes adequately transferred the 180-deg motion of the handles to the near 90-deg opening of the switch blades.

The following conclusions were made:

1. The installation was successful, permitting engineers to proceed with design of the 115-kv subtransmission system.
2. The "zig-zag" type should be adopted because of its flexibility. It can be installed in a triangle formation, and it can also be installed with all units on one side of the pole, permitting its installation on angles up to 90 deg.
3. The top unit should be placed on the side of the pole instead of on top to simplify erection, and it should be moved in as close to the pole as possible.
4. Fabrication of the supporting structure should be arranged separately for uniformity.
5. The triangle design is not favored because of its limitations and its heavy appearance.

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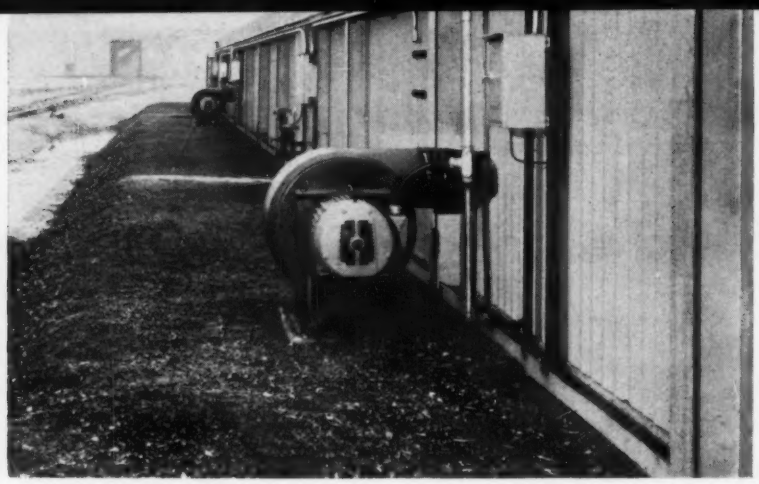
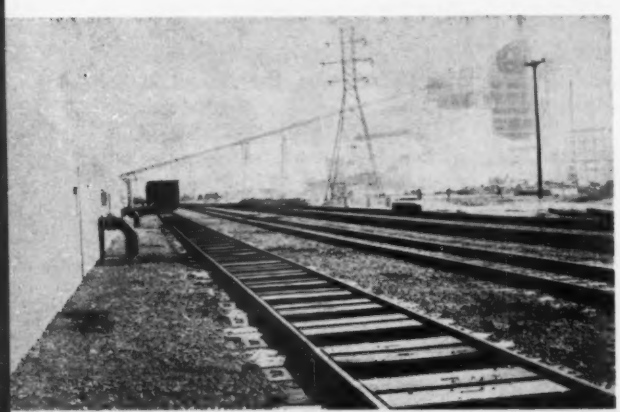


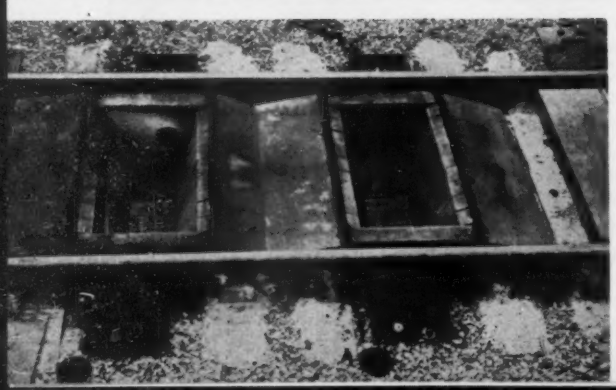
One-Man Thawing Station Beats Winter

During the past winter a one-man thawing station enabled Baltimore Gas & Electric Co to thaw up to ten cars an hour. The 225-ft-long thawing facility effectively handles five cars at a time without damaging the cars. Despite one of the worst winters on record, winter stockpiling of some 90,000 tons of coal at the new Charles P. Crane Station continued without interruption through the coldest weather of the season.

The thawing station was designed and engineered cooperatively by Hauck Manufacturing Co, Brooklyn, N. Y., and the Baltimore Gas & Electric Co to meet the specific requirements of Crane station.

Thirty-six prefabricated thawing pits are so arranged that any size car, or any combination of sizes in a five-car train, can be thawed effectively without damaging the cars. Each pit produces heat at the rate of 1.5 million Btu per hour. The arrangement of the pits makes available to each car as much as 6 million Btu per hour. All pits are operated from one of three remote control panels. The operator simply pushes buttons to start up the individual thawing pits he wishes to use. In the event of failure of air pressure or of fuel or power supply, shutoff is automatic.





The panels from which the pits are individually controlled are installed on a trackside windbreak. Because of the large number of pits and their control by pushbutton operation, radiant heat can be provided immediately to key areas regardless of the makeup of the train. Determining which pits are to be used for thawing depends on the size of the cars. The operator takes his cue from the lead car. This car is properly positioned over the pits to establish a point of reference. After this is done the operator need only observe the position of the cars along the track and start up those pits that are under car sections to be heated. This flexibility of operation not only speeds thawing and saves fuel but also avoids damage to the hopper cars. Any thawing pit beneath a car section vulnerable to damage by heat is not operated.

The thawing equipment is oil-fired. No. 2 fuel oil, pumped from the power plant storage tank, reaches the burners via underground pipeline. Air needed for oil atomization and combustion is provided by low-pressure air blowers.

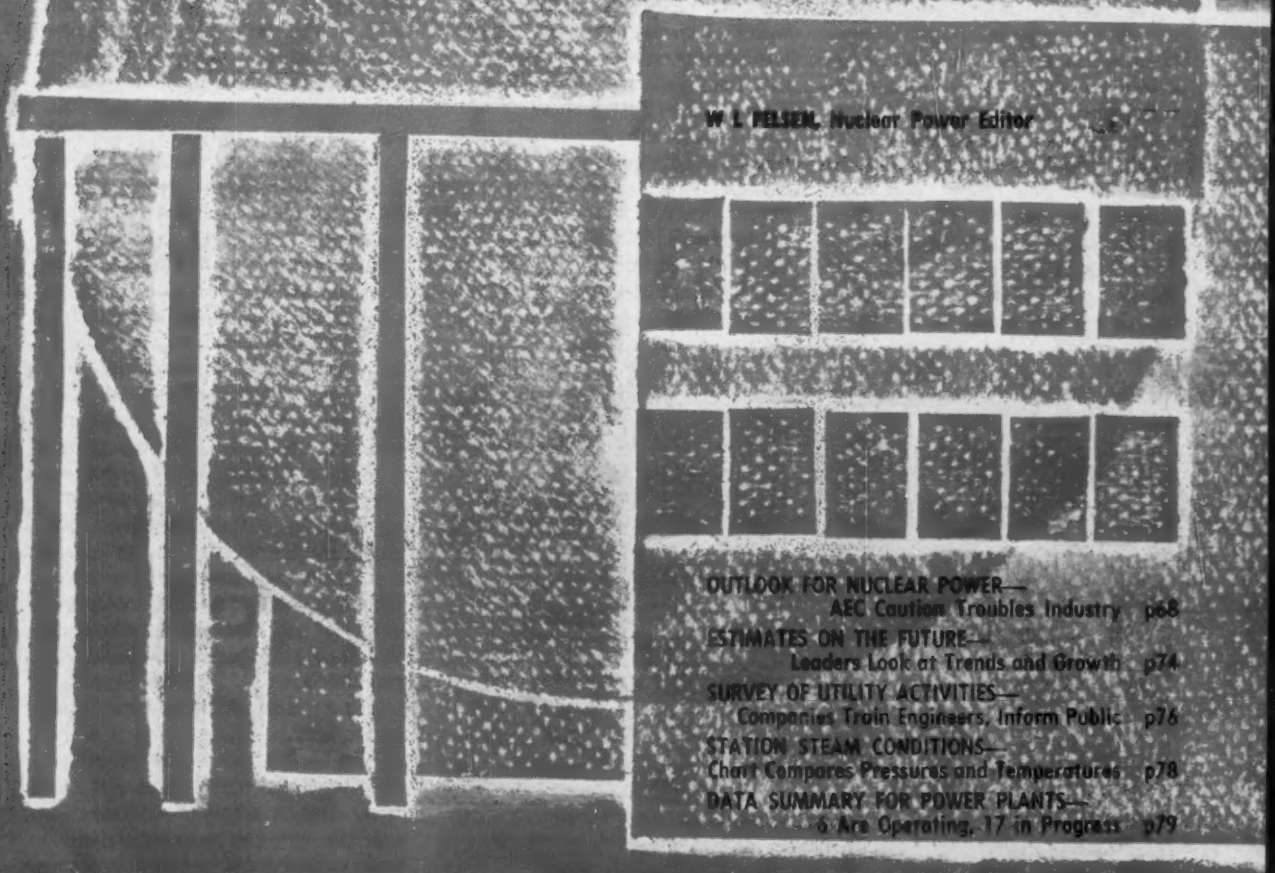
Each of the 36 prefabricated pits contains two burners, a pilot and safety equipment. The pits have hinged, split covers that fold back readily during thawing operations. The covers remain closed to protect the pits when not in use.

Use of prefabricated pits can reduce considerably the cost of installation of a thawing station. Prefabricated pits require no underground form work. At the time the pits are installed a railroad tie is removed from each pit location. No other alteration to the track is necessary. When a thawing station is planned in conjunction with new track, as in the case of the Baltimore Gas & Electric facility, ties are omitted where the thawing pits are to be placed.

A Special Report

6th Report on NUCLEAR POWER

W. L. FELSEN, Nuclear Power Editor



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Outlook for Nuclear Power: Caution

Politics remains a controlling factor; public attitude seems favorable; designs evolve toward quality steam

■ Over the prospects for nuclear power, industry shows guarded optimism on achieving economy and dissatisfaction over the Atomic Energy Commission's increased conservatism in safety matters. The safety question, which has affected siting and reactor design features in the past twelve months, is the top issue today. Yet, despite considerable apprehension over this problem, there are factors for cheer. Among them:

- Yankee, on the line since late last year, has been operating at 90% load factor. For the year 1960, Calder Hall, now well shaken down, did 95.6%.
- Though activity at home has slowed to a crawl, that abroad is picking up. This should help US vendors keep their atomic departments busy.
- Technology, though unlikely to produce spectacular breakthroughs, is steady in its evolution of design, components, materials and understanding of reactor physics.
- The number of operating power plants should more than double this year. The operating experience they will generate will be more valuable than the kilowatthours.

Politics continues to dominate the field. The new Administration's atomic power policy has only begun to emerge with AEC Chairman Glenn Seaborg's testimony earlier this month at authorization hearings of Congress' Joint Committee on Atomic Energy (JCAE). Dr Seaborg proposed several ways of spurring construction of more prototypes. Among them are "still more incentives" in the form of direct subsidies or other financial aid, or, if these "will not suffice," a government program of prototypes for fiscal 1963. Dr Seaborg called the partnership approach disappointing (EW, May 15, p44).

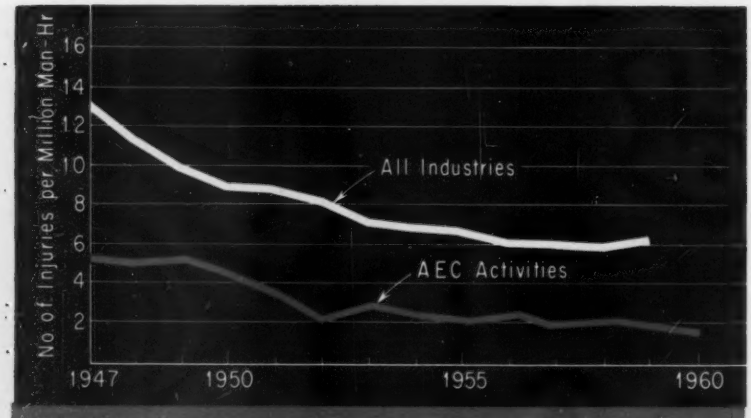
JCAE currently has before it the $95-million budget proposal for New Production Reactor (NPR) generating facilities, to which there is Republican opposition within the Committee. Leader of its proponents is JCAE Chairman Chet Holifield, who has been Washington's most consistent advocate of a vigorous atomic power program. His aim is active construction by whoever will put up the funds. Though he has disparaged both partnership and the investor-owned utilities as ineffective, he continues to urge them to build. Last month before the American Public Power Assn, Holifield summed up his position: "I certainly would not preclude the construction of additional plants by the privately owned utilities which they believe are financially justified in undertaking, but the US program should not be primarily dependent on such projects."

He also feels that the Commission last year was insufficiently vigorous in promoting $70 million of authorized projects. Among them are the Experimental Low-temperature Process Heat Reactor, for which the Point Loma, Calif., site was disapproved last year, and two other water reactors for electric plants, one that the municipalities of Los Angeles and Pasadena dropped and one that neither Dairyland Power Cooperative, Wis., nor the city of Jamestown, N. Y., could find an approved site for. Seaborg is now moving to get them going again.

These three proposed plants exemplified the siting problem that has caused concern through nuclear industry during the past year. The depth of this concern varies, both among manufacturers and utilities, as polls in May *Nucleonics* and on p77 of this issue show. Some are ready to accept remote locations and maintain that the trend toward more interconnections at extra high voltages will make remote sites practical.

Others point out that the effluents from a nuclear plant are less toxic and troublesome to deal with than those from coal-fired plants, hence hold our best hope for future plants in the cities. They also point to containment and back-up safety features. Further, that the manufacturer is not going to compromise the safety of his design with his reputation in such a safety-demanding field at stake. Each emergency shutdown system has its back-up. Double contingency is an accepted engineering safety practice, but, some ask, how far does this have to go—triple, quadruple?—before the postulated accident is no longer credible. At least one nuclear plant will apparently be allowed in heavily populated areas. The NS Savannah is expected to dock in New York and other major harbors.

The SL-1 accident has, of course, had its effect on this increased caution. But a frequent comment is that the "tin can" around it, which is no containment vessel, did, never-



SAFE NUCLEAR INDUSTRY Injury rate of 1.68 per million man-hr among AEC contractors in 1960 compares to 6.47 for all industries in 1959

Prevails

theless, contain the radioactive products so well that no hazard was created outside this shell.

Publication of "proposed criteria guides" for siting has not yet cleared the air. The publication notice stated that these were guides rather than rules, and its table of "initial estimates of distances" for exclusion zones appeared as part of a sample calculation. Nonetheless, there is feeling that this table may become a solid rule. The period for public comment on the proposed criteria ends next month. One major body, the Atomic Industrial Forum's new ad hoc Committee on National Atomic Policy has submitted its recommendations to the Commission. The roster of this committee reads like an American who's who for nuclear energy.

FUEL REPROCESSING With remote manipulators, technicians analyze solutions from processing streams at National Reactor Testing Station, Idaho

Siting Criteria Change

The criteria already represent one apparent reversal of an earlier ruling. Both Dairyland and Jamestown were told that, for the proposed 60-tMw SSPWR, they must have an exclusion radius of 2,000 ft and a 5-mile distance from the edge of the reactor site to the fringe of the nearest population center. But according to the tables in the proposed criteria, the required distances diminish to 850 ft and 2.1 miles. Four weeks ago, the Commission, in inviting Dairyland to bid on a 50-Mw organic-reactor plant (about 150 tMw), pronounced its proposed site acceptable.

Hand in hand with siting considerations from seats of authority go those of the public. Smoothing the ground for public acceptance has been a major aim of the nuclear industry's relations effort. Results to date appear successful. There has been no significant opposition to nuclear plants in any of their areas. That to the Enrico Fermi plant has come from unions. The public in this area has not displayed any resistance.

The greater Chicago area provides a good example of harmony. Perhaps because the first nuclear pile operated there long ago in the heart of the city, northern Illinois residents seem to accept fully their nuclear plants. EBWR has been operating there for five years and Dresden for many months. Argonne has five other reactors, Armour Research Foundation has one in Chicago, and two others, now dismantled, used to operate in the area. The reverse of opposition has resulted: a developer is promoting a new industrial park near the Dresden plant.

There still are people who confound nuclear power with powerful nuclear weapons. A group of church press representatives interviewed the director of a national laboratory and kept steering the questioning to the H-bomb. Beyond the simply uninformed, some active opposition exists. The most lasting can be expected from alarmists, who have cried doom at engineering developments since Fulton's *Clermont*, which some feared would blow up. And there are special cases. A woman in Chicago used to phone Argonne and tell them, "You've got your reactor turned on. I can feel the beams." Sometimes she was right.

The best informed citizens, of course, are those who work in the nuclear field. These employees—engineers, technicians and non-technical personnel alike—understand their situation, cooperate with routine plant safety measures and appreciate the need for them. Far from dreading their environments, they are enthusiastic about the field they work in. Collectively, they have posted one of industry's most impressive safety records, as the accompanying graph for AEC operations illustrates. Sandia Corp, Albuquerque, employees scored a record of over 14.9 million injury-free man-hours.

Less in the news than siting is the other aspect of safety, design reliability. The regulatory sectors of the AEC have been reviewing designs and proposed changes in existing plants with closer and closer scrutiny. This has made hearings more trying, has made more work for designers and reactor owners, and has made more trips to Washington necessary.

The ruling last year, since mitigated, that every small change to the Vallecitos boiling water reactor would have to be approved first by the Commission roused reactor operators. The end ruling permitted General Electric Co to make changes "within the parameters of the technical specifications, provided no unreviewed safety question is involved."

The more recent case of 17-4 PH steel stress cracking in the same reactor was ruled as involving an unreviewed safety question. The same material in other reactors has resulted in delays in construction and revisions to components. This

metal, heat treated at the same temperature as that for VBWR, has performed satisfactorily in EBWR over a long time.

A Manhattan District veteran commented, "Regulatory actions that the reactor buyer couldn't anticipate have a way of raising nuclear plant costs." Another engineer said the existing situation would certainly give a utility executive pause about building a nuclear plant on his system. A third was terse: "It makes life harder."

On the other hand, both New England Electric System and Pacific Gas & Electric Co, which have nuclear plants delivering electric energy now into their systems, are lined up for more, PG&E for its third plant. Southern California Edison Co is continuing its site negotiations. Observers would not be surprised if, after Indian Point gets going, Consolidated Edison Co put a second nuclear plant alongside it. Los Angeles Dept of Water & Power withdrew its 50-Mw ICBWR proposal, not because it lacked interest in nuclear, but it had interest in a second plant of 300 Mw for the site. But the ACRS had disapproved the site for this many nuclear megawatts. "Every new industry has had its growing pains," a consulting engineer observed.

Concurrently with the safety question, there have for some time been expressions that the Commission's regulatory and promotional functions were incompatible. Three organizations' proposals for separating these functions probably will be a subject in JCAE hearings this session. The proposal of one of these three, the Commission itself, has already been put into effect on an interim basis until some further decision is reached between that one, the proposals of the JCAE, and those of a study group at University of Michigan law school.

All three proposals call for a less active role for the Advisory Committee on Reactor Safeguards (ACRS) and all three suggest an easing on hearings when no substantial safety question is involved. The results, both of reorganization and its eventual effect on the application of regulations, will not be discernible for some time. It is probable that in the shifts, the personalities involved, including the AEC chairman, will be initially, at least, more significant than the new framework.

Outlook Is Favorable

The safety questions have appeared here first because they are uppermost in the minds of the nuclear people *Electrical World* has contacted. Though the foregoing may sound pessimistic, the balance is really tipped the other way.

The most persistent question is when will nuclear power compete with conventional. *Electrical World* joins some leaders in the nuclear field in declining to predict when and defers to them in estimating some of the significant factors (p 74).

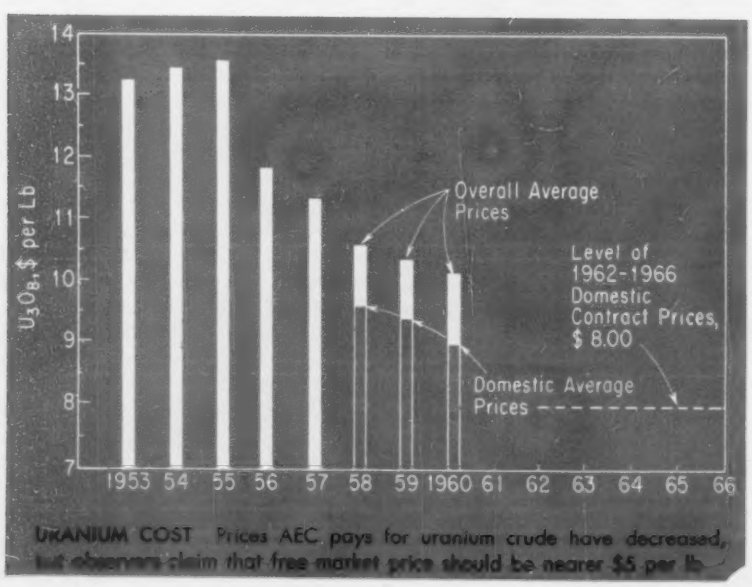
Improvement in another significant factor, the AEC's price of enriched uranium, ought to be expected, according to some observers, among them GE's Dr Lyman Fink. In his testimony at the JCAE's 202 hearings, he said that his company had got open market quotations under $5 per lb of U_3O_8. His contention is supported by bids down to $4.37 submitted last October to Japan, some of them by the AEC's suppliers. Further investigation indicates, however, that this low a price can be offered only for uranium off the top of the market supported by existing contracts.

The AEC's own prices for uranium concentrate have shown a steady drop (see graph). But its contracts for the 1962-66 period are written for the earlier-set price of $8.00 per lb with most millers. Two years ago, an Atomic Industrial Forum team, at the AEC's invitation, found that the government's "price of U_{235} . . . should not increase and a decrease might be warranted," but recognized that the 4% use charge was low and probably an offsetting factor. The $12-per-gram buy-back price for plutonium has also been called artificially high, hence also an offsetting factor.

Political observers claim that the Defense Dept is overstocked with nuclear weapons material. The diffusion plants recently cut back on their power consumptions, but the AEC attributed this to improvements in efficiency, not to a production cutback. How these movements may affect nuclear fuel prices is beyond reckoning here, not only because the determining information is classified but because it is said to be complicated even to insiders.

Another phase of the fuel cycle, reprocessing, remains also in AEC hands. The Industrial Reprocessing Group of five investor-owned utility companies with Davison Chemical have been studying feasibility of a commercial reprocessing plant. Their second study continues.

Some other trends, particularly in reactor technology, are readily discernible. Water reactors currently have the upper hand. Of 23 nuclear power plants for this country, 15 are water types, including all those of 100 Mw and up (p 79). The Canadians favor heavy water; the British and French, gas. But all these



URANIUM COST Prices AEC pays for uranium crude have decreased, but observers claim that free market price should be nearer $5 per lb

Over a dozen reactor types have been proposed besides those now being built as power reactors. Some are being built as experimental reactors, others being tried out as critical experiments, some are on paper.

Beryllium oxide: being built; BeO moderated, helium cooled
Boiling sulfur: experiment ended because of corrosion
Epithermal thorium: sodium-cooled; converts Th to U^{233}
Fluidized bed: water or organic without control rods
Gas suspension: cooled by gas with fine particles in suspension
Mercury-cooled fast reactor
Molten plutonium: LAMPRE critical; see text
Molten salt: being built; see text
OCDRE: organic coolant, D_2O moderator; at Whiteshell, Canada
Pebble bed: ceramic-coated particle fuel, gas cooled
Plutonium recycle: Pu fuel cycle experiment, water cooled
Spectral shift: see text
Steam cooled: 10 variations proposed; graphite, D_2O, H_2O moderators
Supercritical water reactor
Variable moderator reactor

Fusion power: experiments by Texas utility group and government contractors

FUSION RESEARCH Deuterium plasma is heated to high temperature in a pinch tube. Project is utility sponsored

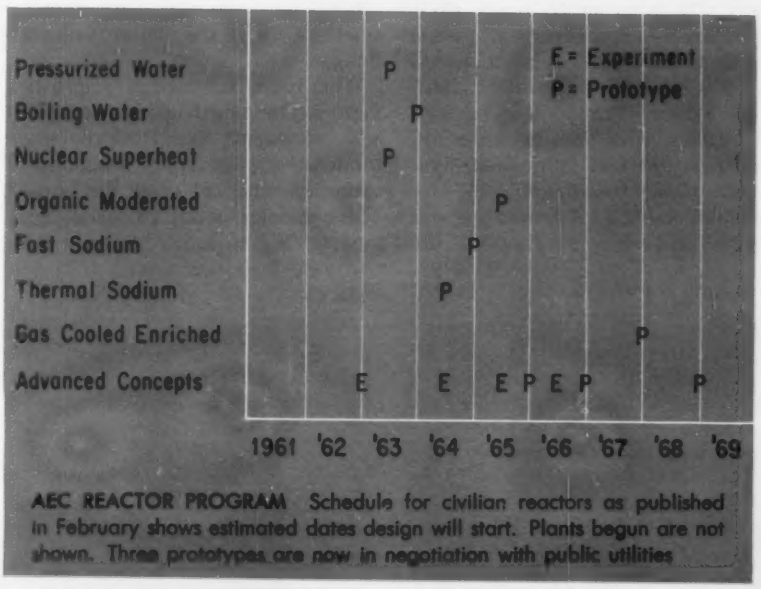
three have limited their choice by their basic decision to fuel with natural uranium.

The design trend here is almost unanimously toward modern steam conditions. Superheat experience is negligible so far, but several are on the way. Liquid-metal and high-temperature gas-cooled plants will yield quality steam. With integral superheat in a water reactor and a separate reheat reactor, one designer expects in a few years to push plant efficiency up to 43% with temperatures and pressures comparable to those in today's boilers.

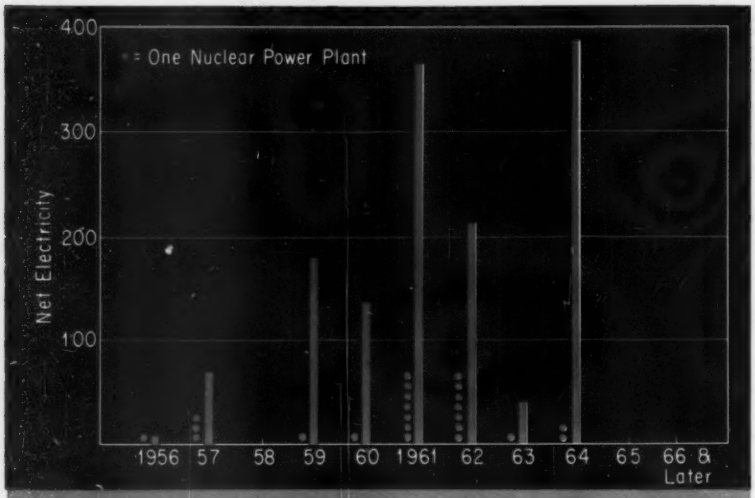
Other reactor concepts are not in short supply (see box). Two, a molten salt reactor, which burns homogeneous fuel, and a gas-cooled unit moderated by beryllium oxide, labeled BORE, are under construction as experiments. Another homogeneous experiment, LAMPRE, which is fueled by molten plutonium, went critical last month at Los Alamos Scientific Laboratory, site of the first plutonium reactor, Clementine, dismantled in 1953. Seven unspecified advanced concepts beyond these projects already started are scheduled for construction under the civilian power reactor program as it was outlined by the Commission last February (see chart).

A new development announced last year should provide better neutron economy, hence lower fuel costs, for pressurized-water reactors. This is the spectral-shift reactor, which has for its moderator-coolant a mixture of heavy and light waters. The percentage of heavy water is decreased during the life of a core to maintain the reactivity at the desired level. This is an improvement on the older concept of leveling reactivity over core life with a burnable poison.

This year, as many as seven new



AEC REACTOR PROGRAM Schedule for civilian reactors as published in February shows estimated dates design will start. Plants begun are not shown. Three prototypes are now in negotiation with public utilities



ATOMIC POWER GROWTH Building schedule by number of plants and megawatts for years due critical shows prospective gap after 1964

power plants may go critical. All have novel features. BORAX-5, a boiling-water reactor, has integral superheat. Both EBR-2 and Fermi are fast breeders, the latter with nearly five times the output of the first. At Hallam will be the first test of a thermal-neutron liquid-metal plant of substantial size. Because of fuel fouling in the Organic-Moderated Reactor Experiment, the Piqua organic plant's experience ought to be valuable. The other two are water types. That at Indian Point has a thorium blanket to demonstrate the Th-U^{233} fuel cycle, while Elk River will show the operation of an indirect-cycle BWR with fossil-fueled superheat. Most of these have been delayed several months from their scheduled start-ups by such troubles as strikes, difficulties with reactor materials, and delay in fuel fabrication. Another plant, though not due for completion until 1965, was dropped by the AEC May 9 because of development problems. This was the Florida project, which had long been beset with difficulties in developing a suitable cladding.

Plants now coming on the line were designed very conservatively because initially designers had little knowledge of reactor design coefficients, such as burnout margin and hot-channel factor. Dresden is licensed for 626 tMw, but its designers think now they can raise this to over 900 tMw, largely by permitting a higher void limit, the limit of volume occupied by steam. This extra thermal capacity due to conservative design, evident also in other water reactors, has become smaller with the more recent designs.

The room for design improvement was summed up by a designer's comment that "we've just scratched the surface." Two other manufacturers said much the same. The computer is one of the design tools aiding advance. At least 34 computer programs, from Atbac to WB TSG 1, have been developed for nuclear reactor work.

"Materials are basically responsible for most of the limitations affecting the economics of nuclear power," Les Staebler, senior assistant director of the AEC's Div of Reactor Development, said earlier this year. Materials development continues on fuels, structural metals, fabrication techniques, nondestructive testing, and on many other fronts.

Numerous problems confront the nuclear researcher before a material ever gets out of the laboratory. One is the difficulty of determining what a substance will do in the reactor environment over the long haul. Accelerated tests and time extrapolation of short-duration tests serve only as indicators; the only proof comes from operation in a power reactor over expected life.

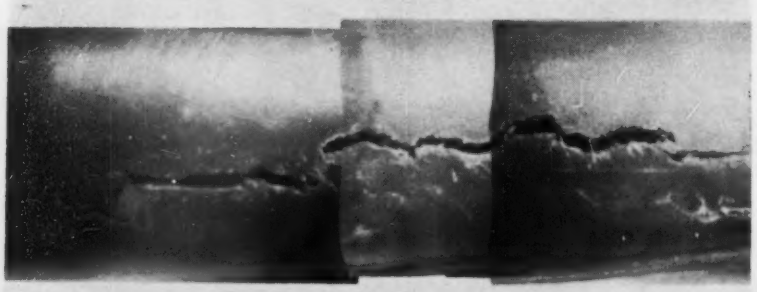
Research Expensive

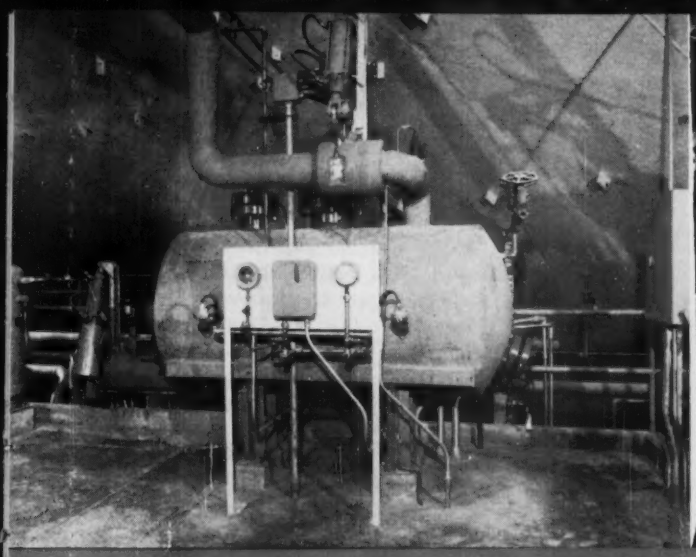
Another difficulty was pointed out by Battelle's Dr R. W. Dayton at the 202 hearings: "The cost of working in this field is far beyond anything to which we were accustomed in the preatomic era." Test loops, irradiation test facilities, remote fabrication, demand for extreme material purities, and extra measures to ensure safety run R&D costs 'way up.

But advances are steady. Metallurgists are investigating alloys of niobium, which exhibits nuclear properties desirable for cladding. It reacts, however, readily with oxygen, hydrogen and water vapor, so corrosion-resistant alloys are being sought. Zircaloy 2, long a favorite for cladding, suffers from hydriding, apparently in the presence of fluoride impurities (see photo). One potential remedy developed is an overclad of 1 mill of stainless steel. Both zirconium and niobium are in plentiful supply, have low neutron absorption cross-sections, and display good structural properties.

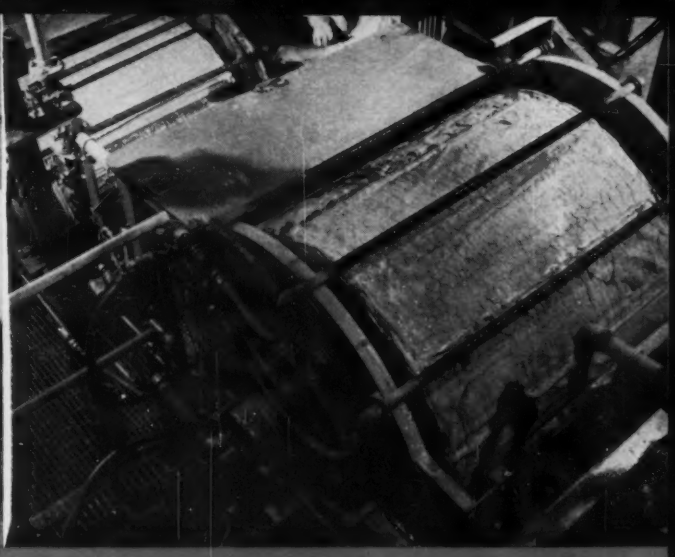
Carbon steel is being used for vessels and piping in organic reactors and for primary-loop piping at water-cooled NPR. Some metallurgists maintain, however, that the costs of the metals that go into these components are small alongside the costs of fabrication. Their preference is still for stainless steel or even for Inconel at two to three

ZIRCALOY DAMAGE Irradiation of Zircaloy clad over high-fluoride-content UO_2 cracked in a matter of hours in test at Chalk River, Canada





NUCLEAR AUXILIARY Dresden borate tank for shutdown backup typifies atom plants' extensive chemical facilities



CRUDE FOR FUEL "Yellow cake," U_3O_8 concentrate is scraped from filter press at Rifle, Colo., mill for sale to AEC

times the price of stainless.

Ceramic coatings for fuel in the form of particles may prove sound enough after long irradiations to prevent escape of fission-product gases and prevent chemical-reaction damage to the meat.

Uranium dioxide is still favored as the fuel for the near future. Plutonium, other forms of uranium, and the Th-U^{233} cycle are still very much in the picture, with uranium monocarbide getting considerable attention for non-water reactors. Gas centrifuging remains a question mark for cheaper enriched uranium. The AEC says that "the use of this method for producing weapons material is several years away." Presumably this also applies to nuclear fuel.

Many firms, some under AEC contract and some on their own, are working on techniques for assembly-line fuel-element production. Among them are UO_2 sintering, electronic welding, co-extrusion of stainless steel clad over UO_2, and various other ways of bonding cladding and fuel. Quality control of fabrication has improved through such non-destructive testing media as ultrasonics, eddy currents and gamma scintillations.

These are but examples of the many lines of R&D. The AEC's *Nuclear Fuels and Materials Development* (TID-11295, Feb. 1961, and supplement) gives a broad view.

Nuclear physics research continues, too, for, as a national laboratory director put it, "There is still a lot yet unknown basically." Particle accelerators are the most spectacular tools. Research in reactors, investigation of lesser-known elements, and mathematical studies carry this work forward.

Most of these developments have been brought about by manufacturers and national laboratories. The utility companies, too, have continued participation, not only in financing new projects, but on the technical front as well. Niagara Mohawk Power Corp will design the Vallecitos Experimental Superheat Reactor plant, which is largely financed by ESADA, the union formed last year by seven New York investor-owned utilities. A view of utility activity is given by the survey on p 76.

Consultants Active

The consulting engineering firms' nuclear experience has been on broad lines. They have made studies and estimates, performed design work, undertaken equipment procurement, and supervised construction of nuclear plants, both for the AEC and industry. Their role has varied from turn-keys on the one hand to an opposite case, in which a consulting firm designed the reactor and procured core, vessel and other components individually from vendors.

This degree of technical advance across the field reflects the personnel condition. The nuclear field continues to attract able scientists, engineers, and technicians. More are becoming available. The dropping of the Defense Dept's Aircraft Nuclear Propulsion program is ending many jobs. Many schools offer nuclear courses: over two score universities have reactors.

Most of these many factors help reduce nuclear plant costs. That the cost outlook is more favorable than last year was brought out at March's American Power Conference, where manufacturers vied in their claims. One asserted that a 500-Mw plant for startup in 1965 would initially produce 6.56-mill energy under favorable conditions.

Industry is watching to see what operating experience will prove. Already the operators of Yankee, which has carried load for six months, expect to beat with their first core the energy costs they had earlier expected from their third core. Dresden is again operating and both these plants probably will demonstrate refueling next spring. Nuclear-plant maintenance is yet to be demonstrated. But the ease of plant operation so far gives much cause for optimism.

Much of this outlook for nuclear power has been review to show problems, prospects for their solutions, and trends in development. The future is the projection of these considerations, but a projection that can be made only across the variables of regulation, technical advance in conventional plants, the economy of large units, and the question of investing in plants not yet competitive.

Atomic Power Leaders Optimistic

TITUS LeCLAIR, Manager, Nuclear Power Applications, General Atomic, Div of General Dynamic Corp, San Diego, Calif.

■ The downward trend in the cost of nuclear power plants is so pronounced that development and construction of plants should be pushed to achieve the goal of competitive power. How soon will nuclear be competitive? My personal crystal is too cloudy to predict how soon the atom will compete with "king" coal.

To replace the crystal ball, I asked the leaders of nearly 40 organizations, men who I knew had given serious thought to nuclear power, to consider factors which bear on the future economic prospects. They represented 29 utilities, three national laboratories and seven manufacturers in the atomic energy field. Here is the summary of their thinking.

Since nuclear and fossil power costs are not far apart in certain areas, any material change in basic fuel costs could affect the competitive position. The summary guess on the change in the cost of fuel between the present and ten years hence is:

	Average Estimate	Range of Estimates
Fossil	Up 12.9%	0% - up 33%
Nuclear	Down 9.4%	Down 30% - up 5%

These figures indicate the total spread in fuel cost per kilowatthour, assuming there is no change in the relative plant efficiency. Most nuclear plants at present operate at low steam pressures and temperatures and relatively low efficiencies. Therefore, I asked opinions on the expected changes in overall thermal efficiencies in the same period. The summary of opinions on their increase follows:

	Average Estimate	Range of Estimates
Fossil	2.9%	0-6%
Nuclear	4.5%	1-9%

Increase from 30% to 33% = 3%.

The foregoing are, of course, not the only things which will affect the race toward economic power. These factors merely set the stage for the ingenuity of designers in simplifying designs, reducing costs and improving efficiency. Improving efficiency includes both plant efficiency and efficiency in the burnup of the nuclear fuel. Our correspondents presumably took this into account in rendering their opinions as to what portion of the new power-plant capacity ordered in a given year would use nuclear instead of fossil fuel for the United States as a whole. Their estimates on nuclear portions follow:

	Average Estimate	Range of Estimates
1965	4%	0-20%
1970	10%	1-30%
1980	25%	2-75%

One quarter of the market in 20 years may sound a little discouraging. Let us remember that if this estimate should turn out to be correct, 25% of the predicted new generating capacity ordered in 1980 would be over 10 million kilowatts, if we assume an average annual load growth of about 6.7% and a fairly uniform construction schedule.

If these figures were translated into the total nuclear generating capacity on the line in order to measure the need for nuclear fuel, the accumulated nuclear capacity in service would be:

1965	1.4 million kw
1970	5 million kw
1980	45 million kw

No attempt has been made to correlate detailed predictions on fuel costs and these other factors with the total competitive position of nuclear power. However, the margin has become so narrow between power costs from nuclear fuels and from fossil fuels that any predictions are hazardous at best. These predictions could prove wildly optimistic if nuclear power costs went up and fossil fuel costs went down. They could also prove very conservative if nuclear power costs were brought down rapidly. This is just another illustration of the workings of the vigorous competitive system which so far has held down the price of electricity against the rising trend in costs for materials and labor.

Aside from nuclear power costs, if the ten-year doubling rate of growth continues for another 40 years, some interesting problems might arise. For example, let us suppose that all the power in the Chicago region is produced from coal and that the use of this coal doubles every ten years. Let us assume further that all of the coal for the Chicago region is shipped by rail over a single route. If you were stopped at a railroad crossing for a shipment of one day's coal, how long would you have to wait?

This is an adaptation of a paper presented at the American Power Conference, March 23

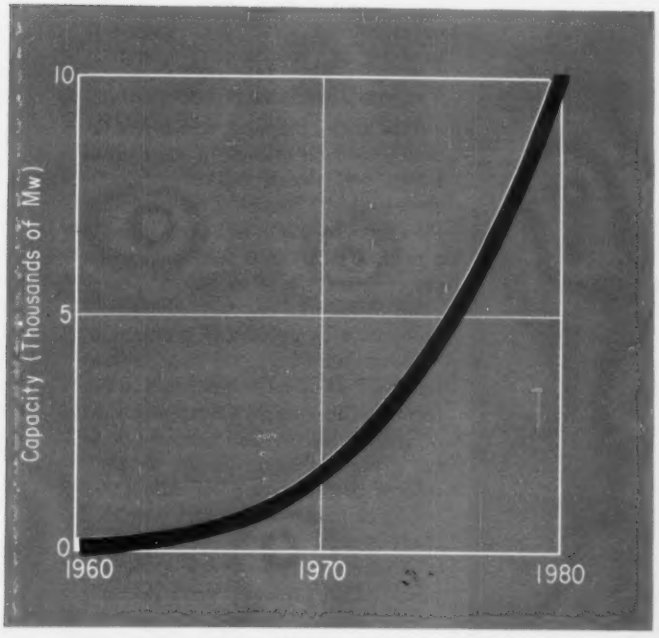
on Future

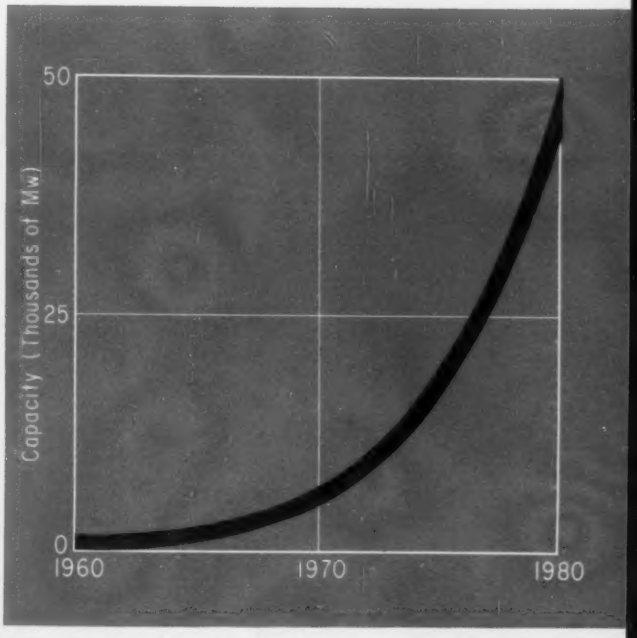
You can make your own guess as to how long, because transporting that amount of coal would require 100 train loads with 100 cars in each train.

Transportation is only part of the problem. The burning of these quantities of coal results in tremendous quantities of ash, which must be disposed of, and large quantities of combustion products, which disperse into the air. It might reasonably be asked, "Aren't we trading one waste problem for another by going to nuclear energy?" This is true in part. Spent nuclear fuel and fission products must be handled with care and shielded in concrete vaults. However, the spent fuel resulting from operation of a 1,000-Mw high-temperature gas-cooled reactor plant for 30 years could be stored in a quarter-acre vault 20 ft deep. The ashes from a coal-fired plant of the same size might occupy 1,000 times the volume. And the gaseous waste from a nuclear plant will be no harder to handle than the waste products from a coal plant.

In summary, I believe the achievement of economic nuclear power is a difficult task, but one well worth the effort. We have come far enough along the road to have confidence that the atom will be an important addition to our sources of energy for the future. The big question is *when.* Opinions from leaders in some 40 organizations are not consistent. Perhaps the reason is that the date of achieving the economic goal depends on the strength of effort made by the team of manufacturers, utilities and government. Regardless of the timing, competition will make nuclear plants simpler, more efficient and less costly.

FLOW EXPERIMENT On half-scale model of Peach Bottom reactor, engineers check heat flow, transfer



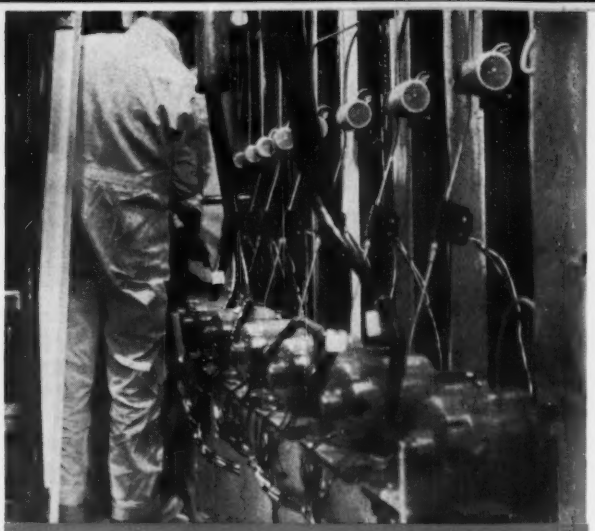


LONG-RANGE GROWTH Nuclear men estimated capacity ordered per year (left), accumulated nuclear capacity

6th Report on NUCLEAR POWER

Atom Activities Boost Company's Image

Training of engineers, increased cooperation with other utilities in non-nuclear matters also cited as benefits of nuclear projects



SHIFT OPERATOR At Yankee, plant employee checks part of the system for in-core instruments

■ "Powerful aid in maintaining a public image of a progressive company" is the evaluation by one Midwest utility of its participation in a nuclear project. Others, too, that are participating in atomic-plant programs cite the public relations dividends on their nuclear investments. A significant minority, however, indicate they have no public relations programs in favor of nuclear power.

Public relations and personnel assigned to nuclear power were reported on by nearly a hundred investor-owned utility companies surveyed last month by *Electrical World*. All those surveyed have invested in nuclear projects, most of them in two or three projects. Far the majority, of course, do not have nuclear plants located on or planned for their own systems. Only 13 companies in the country do. Among these 13, some have large nuclear organizations, including reactor operators licensed by the AEC and engineers. The results presented on these pages are taken from the responses of the 85 companies that do not have their own plants.

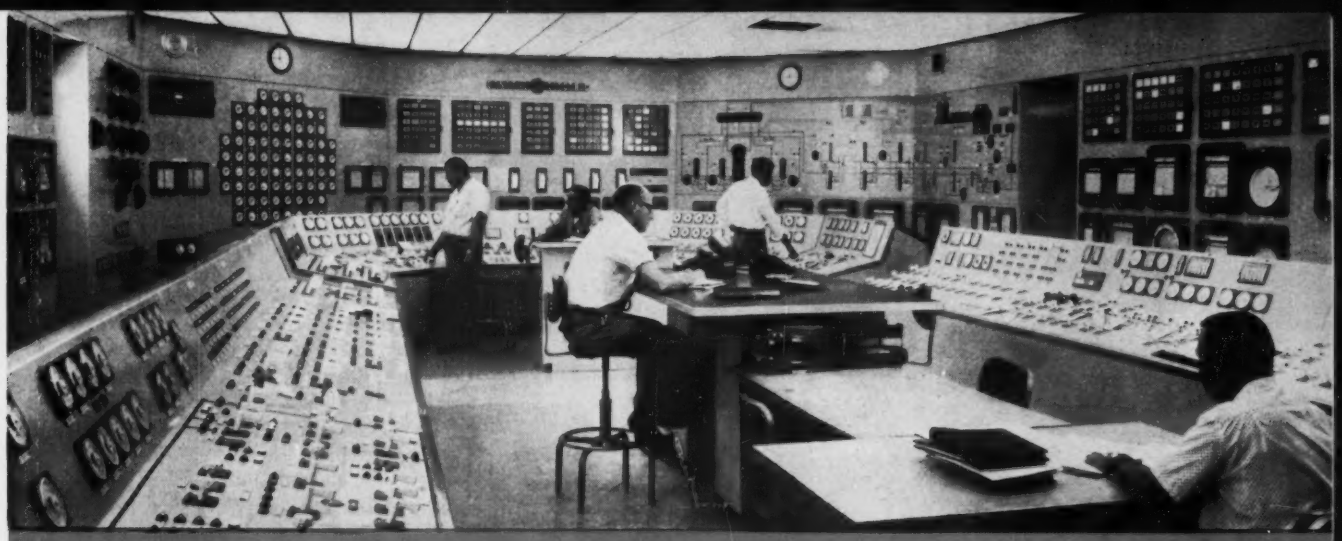
Only 16 of them have formally organized nuclear groups, but others said that designated engineers and administrative personnel are responsible for following their projects and keeping informed on nuclear developments. These same companies have 95 employees receiving training at nuclear plants. Clearly, then, the small number of persons formally organized in nuclear groups does not show the depth of interest of these companies. Some of those with no nuclear organizations have sent engineers to work in projects they support.

UTILITY DESIGNED PLANT Atomic Power Development Associates, formed by 31 companies, designed Enrico Fermi plant, trained many utility engineers

Trains Nucleus Group

One such company, which has invested over $2 million in the Enrico Fermi and Peach Bottom projects, answered, "Through this program, the company plans to have available a nucleus of trained personnel when the construction of an atomic power plant in its area appears advisable." Another with no formal group said, "About ten persons (administrators and engineers) have had some formal schooling in the applications of atomic energy and consider it to be a part of their duties to keep informed. A group of about 25 young engineers meets regularly as a study group."

A utility with a nuclear group replied, "This project [Peach Bottom] is now only in the research and development stage, but knowledge of its progress and problems is used by



OLD HANDS, NEW PLACES Utilities have given employees already on the payroll training for nuclear plant operation. Here, Dresden operators man their control room. Eighty control rod indicators make a nearly square array at left

the Atomic Power Division in their continuing survey of the entire atomic power reactor industry leading toward an intelligent decision to build such a plant some time in the future. . . . We have over 20 engineers experienced in various phases of atomic power."

Cheap Fuel an Influence

Different feelings were expressed by some smaller companies and by some in areas of cheap fuel. A Northwest utility pointed to its plenty of hydro, while others mentioned coal in their service areas. One with little present steam capacity and little future need for any has been "reviewing and compiling information and data furnished by HTRDA. In the future, we would expect to consider assignment of engineers to observe the operation of the Peach Bottom plant. However, we do not feel our engineers would be justified in following the construction progress on the ground."

While training and keeping up with nuclear progress are aimed at the future, some public relations benefits, such as improving corporate image, are more immediate. The public relations programs are broad and are aimed at the stockholders and employees as well as at the consumers. News releases, special publications and exhibits were named as the chief media, but another not included on the questionnaire sent out, programs before civic groups and clubs, apparently has wide favor. "General Dynamics film 'Reaching for Atoms' being shown to thousands — luncheon clubs, schools, etc, in service area this year and previously had given Disney film 'You Find the Atom' wide showing." Those with no active public relations programs on the atom number 32.

Most utility companies are aiding education. The annual Youth Conference on the Atom is widely supported. Typical further programs include seminars for high school students at local universities and send-

Summary of survey among 85 investor-owned utilities without nuclear plants located on or planned for their systems.

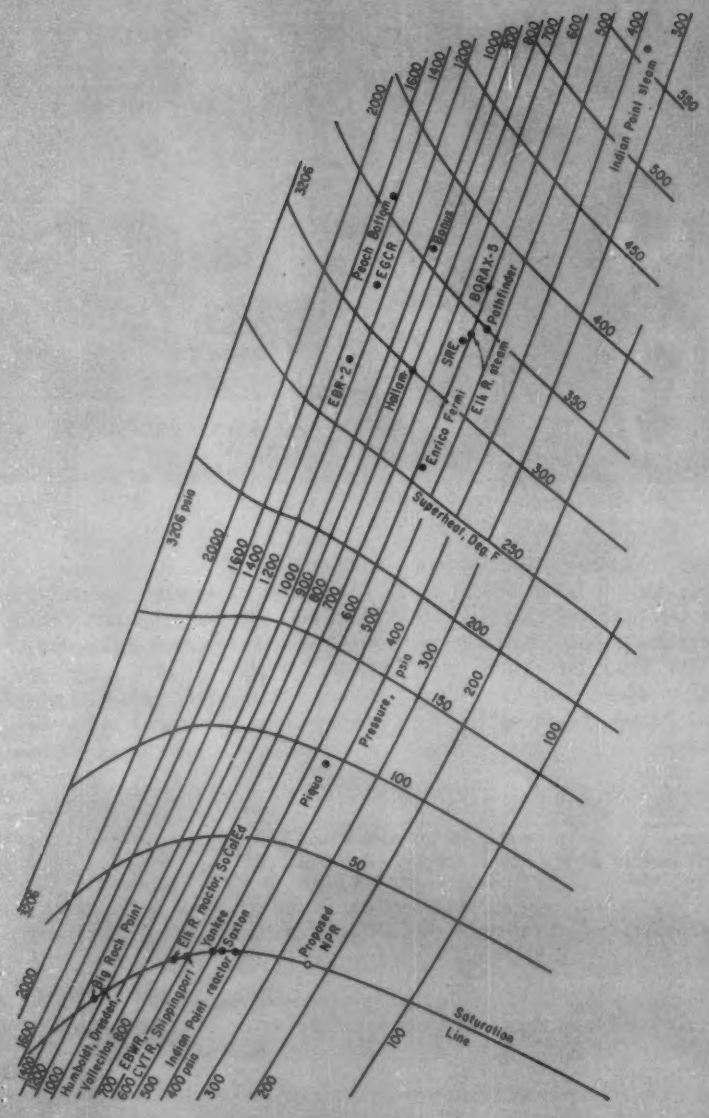
16 companies have nuclear organizations, 69 do not. The 16 comprise 36 engineers and scientists, 7 administrative personnel and 12 technicians

99 employees of the 85 companies have received training at nuclear plants, 65 at plants these companies have invested in, 34 at government facilities.

Aside from the mills-per-kwhr cost of energy, these factors would be decisive in considering whether to build nuclear plants:

	Factor for	Factor against
Siting	13	38
Public reaction	31	12
Preparation for future through experience now	45	9
Quality of steam	1	35
State of reactor technology	3	54
Effect of 80%-load-factor nuclear plant on system engineering	3	41
Extent of present commitment to nuclear programs	15	35

Several responders stated that mills per kwhr is the only criterion



Steam Conditions Compared

Pressures and temperatures vary widely for the 23 nuclear plants operating, under construction and in design. The liquid-metal, organic and gas-cooled reactors produce superheated steam, while most of the water reactor plants operate on saturated cycles. Nuclear superheat experience is negligible to date in this country. EBR-1, a liquid-metal fast breeder, generates 200 kw with steam at 405 psia, 529F, which is 83F of superheat. Superheat loops have operated in test reactors. Two plants that appear twice above, Elk River and Indian Point, will have fossil-fuel superheaters. Pathfinder, BORAX-5 and BONUS are the water reactors with integral superheaters.

The proposed NPR plant at Hanford is also shown. Of several cycles studied for it, all with saturated steam, the highest pressure is 235 psia for the power-only period. During the dual-purpose period, its proposed cycles call for 135 and 90 psia.

ing students to visit atomic laboratories. A southern utility arranged a visit of its state's newspaper editors to the Fermi plant.

Utility attitudes on siting, public attitude and some other factors are summarized in the box. One company checked "factor against" after "public reaction" because the company is in a coal area. Another checked neither because "in our opinion, local public reaction will vary from time to time, depending on what has appeared of a favorable or unfavorable nature in recent news." A clear majority, 49 to 14, think public reaction would be favorable if they announced plans for nuclear plants with construction starting in 1962.

Cooperation Gains

Utility cooperation was hailed several ways. One was "the sponsorship of Yankee by the ten largest utilities in New England as a working example of regional thinking in our industry and a progressive outlook, including an awareness of need for R&D in our area." From the Great Lakes region: "Participation has shown how groups of companies can be organized to do research and development where needed but too expensive for an individual company. This demonstrates that we do not have to rely on the government to develop atomic energy for us. Also, it is making the utility industry research-minded."

This cooperation has had some side benefits as well. One company, through its nuclear project, "has developed closer ties with sister utilities on problems other than nuclear." A Midwest responder said, "We have achieved better communications at a technical level than had ever been possible previously."

Siting Problem Cited

Two other comments revealed reservations about siting and regulations. "We serve an urban area exclusively. No acceptable site (by present criteria) appears to be available in our service area." . . . "The company has gained a greater appreciation of the regulatory and reporting requirements needed in nuclear plant development." A different type of problem was also indicated. Several companies have had employees trained at nuclear plants, then have lost them to other employers.

Costs Shown for US Generating Plants

■ Twenty-four US nuclear power plants that generate at least a megawatt apiece of electricity are listed on these four pages. They represent 371 Mw of operating civilian power reactors and a total of 1,400 Mw operating, being built or in design. One plant, Yankee, came on the line in the last year and is now delivering 116 Mw to New England's electric lines.

These figures compare with 300 Mw in Great Britain, where another 3,600 Mw are in varying stages of construction and design, with 64 Mw in France, 15 Mw at Germany's Kahl station, and 105 announced by Russia, a total of 574 Mw abroad.

This year, the US output will nearly double if all plants come on as scheduled. Britain's will nearly triple. Canada's first power reactor, 19.3-Mw NPD, a pressurized heavy water plant, will come on the line this year.

Several plants are missing from last year's roster (EW, May 16, 1960). ICBWR, which was dropped by the municipal systems of Los Angeles and Pasadena, and SSPWR, for which neither Dairyland Co-op or the city of Jamestown, N.Y., could find suitable site, have not yet found new sponsors. AEC dropped the 50-Mw Florida project this month. Because this is a round-up of power plants, some reactors that produce no electricity have passed from the list. The big NPR reactor does not appear because Congress has not authorized this proposal.

Cost figures came from various sources, largely from the AEC's "Costs of Nuclear Power" (TID-8531, Jan. 1961). The accuracy and consistency of these figures is affected by some values' not being available, by the distribution of contingency amounts over other categories in a few cases, by the inclusion of certain items' costs in some cases and their omission in others, and by different breakdowns of figures in different sources. For financing schemes, under the first round agreements, the AEC contributed toward R&D costs and, for Fermi, waived fuel-use charges. A second round plant's nuclear system is built by the AEC, which sells steam to a government-owned utility or co-op, which owns the turbine-generator. Under a third round agreement, the AEC and an investor-owned utility usually share R&D costs, the utility finances the plant construction, and the AEC waives fuel charges for five years.

The costs in dollars per kilowatt compare favorably with those abroad. Samples: 580-Mw Sizewell, Britain's largest, $270 per kw; Japan's 12-Mw BWR, $830; Latina, Italy, 200 Mw, $370; BR-3, Belgium, 10.7 Mw, $960.

Station & location	PWR Shippingport, Pa.	Dresden Morris, Ill.	Yankee Rowe, Mass.	Indian Point Buchanan, N.Y.
Status	Operating on 2nd seed of 1st core	Operating	Operating at 116 Mw	Building
Financing	AEC & private	Private	First round	Private
Reactor type	PWR	BWR	PWR	PWR, ff sh
Date critical	Dec. 2, 1957	Oct. 15, 1959	Aug. 19, 1960	Late 1961
Owner, operator	AEC, Duquesne Light Co	Commonwealth Edison Co[2]	Yankee Atomic Electric Co	Consolidated Edison Co
Reactor mfgr	Westinghouse	General Electric	Westinghouse	Babcock & Wilcox
Reactor thermal Mw	236	626	392/485	585
Elec. capacity, gross Mw	68	193	125/145	275 (163+112)
Elec. capacity, net Mw	60	180	116/136	255 (151+104)
Moderator	Water	Water	Water	Water
Coolant	Water	Water	Water	Water
Coolant exit, deg F	537	547	532	519
Coolant exit, psia	1,960	1,000	2,000	1,500
Steam gen exit, deg F	486	547	467	449 sat 1,000 sh
Steam gen exit, psia	600	1,000	500	420 sat 370 sh
Steam flow, lb per hr	850,000	1,400,000 pri 1,200,000 sec	1,800,000	2,200,000
COSTS				
R&D, AEC, $ millions	110.	0	5.0	0
by others	0.5	.....	0.3	10.8
total	110.	.....	5.3	10.8
Land, structures	14.6	.....	8.9	24.5
Reactor plant	18.8	45.[3]	16.8	30.0
Turbo-gen & other plant	12.1		12.4	25.3
Other[1]	27.4	6.3	7.	9.7
Total, expect R&D	72.9	51.3	45.1	89.5
Total, exc. R&D, $ per kw	1,220	.....	331 @ 136 Mw	350

[1] Interest, additional indirect construction costs, contingencies, escalation [2] $15 million contributed by Nuclear Power Group [3] Contract price
Abbreviations: ff, fossil fuel; sat, saturated; sh, superheat

6th Report on NUCLEAR POWER

Station & location	Fermi Lagoona Beach, Mich.	SGR Hallam, Nebr.	Elk River Minn.
Status	Essentially complete, except fuel	Building	Building
Financing	First round	Second round	Second round
Reactor type	Fast breeder	Sodium graphite	BWR, ff sh
Date critical	1961	1961	1961
Owner, operator	Detroit Edison Co PRDC	Consumers Public Power District	Rural Cooperative Power Association
Reactor mfgr	PRDC	Atomics International	Allis-Chalmers
Reactor thermal Mw	300	240	51 (+13 ff sh)
Elec. capacity, gross Mw	100	81	22
Elec. capacity, net Mw	90	76	20.5
Moderator	None	Graphite	Water
Coolant	Sodium	Sodium	Water
Coolant exit, deg F	800	945	538
Coolant exit, psia	20	15	950
Steam gen exit, deg F	742	825	497 sat 825 sh
Steam gen exit, psia	585	815	650 sat 600 sh
Steam flow, lb per hr	960,000	730,000	225,000
COSTS			
R&D, AEC, $ millions	4.5	16.0	0.3
by others	23.2	0	0
total	27.7	16.0	0.3
Land, structures	9.5	7.2	1.8
Reactor plant	22.0	17.5	4.2
Turbo-gen & other plant	10.3	12.3	1.8
Other[1]	14.3	8.0	4.5
Total, except R&D	57.5	45.	12.2
Total, exc. R&D, $ per kw	640	600	570

Station & location	Big Rock Point Charlevoix, Mich.	Pierce, Fla.	HTGR Peach Bottom, Pa.
Status	Building	Canceled by AEC, May 1961	In design
Financing	Third round	Third round	Third round
Reactor type	BWR	Gas cooled	Gas cooled
Date critical	1962	1965	1963
Owner, operator	Consumers Power Co	Fla. W. Coast Nuclear Group[6]	Philadelphia Electric Co, HTRDA
Reactor mfgr	General Electric	.....	General Atomic
Reactor thermal Mw	156	153	115
Elec. capacity, gross Mw	50	57.3	46
Elec. capacity, net Mw	.....	50	40
Moderator	Water	Heavy water	Graphite
Coolant	Water	Carbon dioxide	Hellum
Coolant exit, deg F	550	1,050	1,382
Coolant exit, psia	1,050	520	300
Steam gen exit, deg F	550	950	1,000
Steam gen exit, psia	1,050	1,450	1,450
Steam flow, lb per hr	606,000	350,000	367,000
COSTS			
R&D, AEC, $ millions	4.6	1	14.5
by others	0	2	5.6
total	4.6	3	20.1
Land, structures	6.2	0	3.0
Reactor plant	11.1	0	14.1
Turbo-gen & other plant	6.1	0	6.1
Other[1]	3.3	0	4.6
Total, except R&D	26.7	0	27.8
Total, exc. R&D, $ per kw	550 @ 48.5 Mw	.....	700

[1] Interest, additional indirect construction costs, contingencies, escalation
[4] Central Utilities Atomic Power Associates contributing $3.65 million
[5] Does not include existing turbine-generator
[6] East Coast Nuclear Group shared R&D costs with AEC

Piqua Ohio	Pathfinder Sioux Falls, S. D.	CVTR Parr, S.C.	Humboldt Bay unit 3 Eureka, Calif.
Building	Building	Building	Building
Second round	Third round	Third round	Private
Organic moderated	BWR, int sh	PWR	BWR
1961	1962	1962	1962
AEC, City of Piqua	No. States Power Co[4]	Carolinas-Virginia Nuclear Power Ass'n	Pacific Gas & Electric Co
Atomics International	Allis-Chalmers	Westinghouse	General Electric
45.5	200 (157+43)	62	163
.....	66	19	50
11.4	62	17	.....
Terphenyl	Water	Heavy water	Water
Terphenyl	Water and steam	Heavy water	Water
575	Same	555	547
89	as steam	1,500	1,025
550	489 sat 825 sh	487	547
450	615 sat 550 sh	605	1,025
150,000	618,000	201,000	580,000
3.5	8.5	13.9	0
0	0	1.9	.....
3.5	8.5	15.8	.....
2.8	3.5	3.2	2.9
2.8	7.6	10.7	8.8
3.7	6.7	1.2[5]	5.5
2.5	4.0	2.6	3.4
11.8	21.8	17.7	20.6
1,040	350	1,040	420

BONUS Punta Higuera, P.R.	OMR Site not chosen	Proposed for Camp Pendleton, Calif.	EBWR Argonne, Ill.
Building	In design	In design	Operating on 2nd core
Second round	Second round	Private	AEC
BWR, int sh	Organic moderated	PWR	BWR
1962	1964–65	1964–65	Dec. 1, 1956
AEC, Puerto Rico Water Resources Authority	AEC & co-op or govt utility[6]	Southern California Edison Co	AEC, Argonne Nat'l Laboratory
Combustion Engineering	Atomics International	Westinghouse	Argonne Nat'l Lab
50 (37+13)	.....	1,150	100
17.3	.....	375	5
16.3	50	340	4.5
Water	Organic	Water	Water
Water and steam	Organic	Water	Water
Same as steam	.....	587 2,150	489 615
540 sat 900 sh	.....	495	489
965	.....	650	615
.....	.....	4,500,000	60,600
0.9	.....	.....	.....
0.2	.....	.....	.....
1.1	.....	.....	.....
2.1	.....	.....	1.2
2.9	.....	.....	1.9
2.0	.....	.....	1.1
5.1	.....	.....	0.4
12.1	.....	70	4.6[5]
740	.....	194	1,020[5]

[4] Burlington Light Dept., Vt., Dairyland Power Co-op, Wis., Grand River Dam Auth., Okla., or Plains Elec. G&T Co-op, N. Mex.
[5] Does not include recent $2.1 million to raise level to 100 Mw
Abbreviations: ff, fossil fuel; int, integral; sat, saturated; sh, superheat; CVTR, Carolinas Virginia Tube Reactor; HTRDA, High Temperature Reactor Development Associates; PRDC, Power Reactor Development Associates

Station & location	VBWR Pleasanton, Calif.	SRE Santa Susana, Calif.	EBR-2 NRTS, Idaho Falls
Status	Operating on 2nd core	Operating on 2nd core	Building
Financing	Private	AEC & private	AEC
Reactor type	BWR	Sodium graphite	Fast breeder
Date critical	Aug. 5, 1957	Apr. 23, 1957	1961
Owner, operator	General Electric, Pacific G&E Co	AEC, Al, SoCalEd	AEC, Argonne Nat'l Lab
Reactor mfgr	General Electric	Atomics International	Argonne NL
Reactor thermal Mw	50	20	62.5
Elec. capacity, gross Mw	.....	6	20
Elec. capacity, net Mw	5	5.7	17.4
Moderator	Water	Graphite	None
Coolant	Water	Sodium	Sodium
Coolant exit, deg F	545	960	900
Coolant exit, psia	1,015	18	60
Steam gen exit, deg F	545	825	850
Steam gen exit, psia	1,015	615	1,250
Steam flow, lb per hr	90,000 @ 30 tMw	75,500	249,000
COSTS			
R&D, AEC, $ millions	0	.....	.....
by others	.....	.....	.....
total	.....	8.9	.....
Land, structures	.....	1.9	7.5
Reactor plant	2.5	4.5	9.0
Turbo-gen & other plant	0.6	2.2	3.5
Other[1]	.....	0	5.3
Total, except R&D	3.1	8.6	25.3
Total, exc. R&D, $ per kw	620	1,510	1,450

Station & location	BORAX-5 NRTS, Idaho Falls	Saxton Penna.	EGCR Oak Ridge, Tenn.
Status	Building	Building	Building
Financing	AEC	Private	AEC
Reactor type	BWR, int sh	PWR	Gas cooled
Date critical	1961	1962	1962
Owner, operator	AEC, Argonne Nat'l Lab	General Public Utilities	AEC, TVA
Reactor mfgr	Argonne NL	Westinghouse	Allis-Chalmers
Reactor thermal Mw	20/40	20	85
Elec. capacity, gross Mw	.....	.....	29.4
Elec. capacity, net Mw	2.6	4.5	22
Moderator	Water	Water	Graphite
Coolant	Water and steam	Water	Helium
Coolant exit, deg F	Same as	544	1,050
Coolant exit, psia	steam	2,000	310
Steam gen exit, deg F	486 sat 850 sh	462	900
Steam gen exit, psia	600	475	1,300
Steam flow, lb per hr	.....	70,000	255,400
COSTS			
R&D, AEC, $ millions	.....	.....	.....
by others	.....	.....	.....
total	.....	.....	.....
Land, structures	.....	.....	8.0
Reactor plant	.....	.....	10.6
Turbo-gen & other plant	.....	Existing	2.9
Other[1]	.....	.....	1.5
Total, except R&D	.....	6.25 incl. fuel 5 yr	30.6
Total, exc. R&D, $ per kw	.....	.....	1,370

[1] Interest, additional indirect construction costs, contingencies, escalation
Abbreviations: int, integral; sat, saturated; sh, superheat

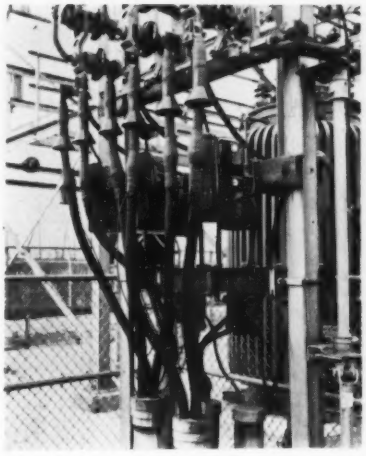
Silicone Tape Solves Termination Problems

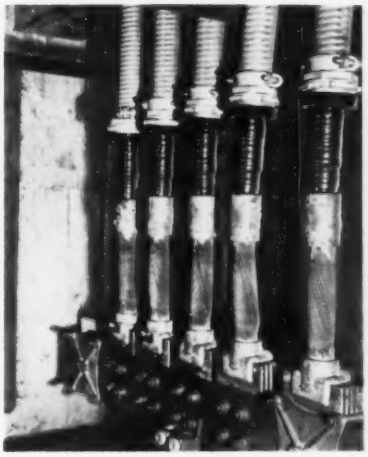
A pressure-sensitive, unsupported silicone-rubber tape manufactured by Minnesota Mining & Manufacturing Co, St. Paul, Minn., combines the physical and electrical properties of silicones in helping to solve high-voltage splice and termination problems.

In representative application, nearly all the outstanding physical and electrical properties which have made silicone-rubber insulation well-known are called on—its moisture and weathering resistance, ability to withstand temperature extremes and prolonged exposure to the effects of heat and cold, its resistance to ozone, corona, tracking and arcing, and many chemicals.

Called "Scotch" brand electrical tape No. 70, it combines cured silicone rubber with a pressure-sensitive silicone adhesive. The tape is designed to be compatible with silicone-cable insulation and can be used as a protective cover on terminations and potheads.

In one application, terminations in the substation were subject to the effects of heavy brine vapor and hydrogen-sulfide gas, plus corona, moisture, sun and the effects of winter and summer temperature extremes. Trackage between the terminal lugs and ground straps on 15-kv stress cones was especially severe in this application, attributable to moisture and the chemical gases. A vinyl outerwrap, specified for the original terminations, lasted only a few months in most instances before the effects of arcing and tracking caused the terminations to fail. Burned-out terminations were rebuilt to previous specifications, using a high-voltage, corona-resistant, self-fusing rubber-splicing tape, "Scotch" brand electrical tape No. 23, and other required materials. The final wrap consisted of a single layer of "Scotch" No. 70 silicone-rubber tape, half-lapped from the point where the cable emerges from its conduit to the terminal lug. Most of the rebuilt terminations protected with the new silicone-rubber tape have now been in service





for over a year with only minor evidence of deterioration. The tape's outstanding corona resistance, voltage endurance and conformability contribute to its successful use.

At another application "Scotch" No. 70 tape was used to reinsulate silicone-covered cable where the jacket and insulation had been removed to allow installation of the cadweld terminal lug. The silicone-tape reinsulation on the cable provides a seal to prevent wicking of moisture into the cable.

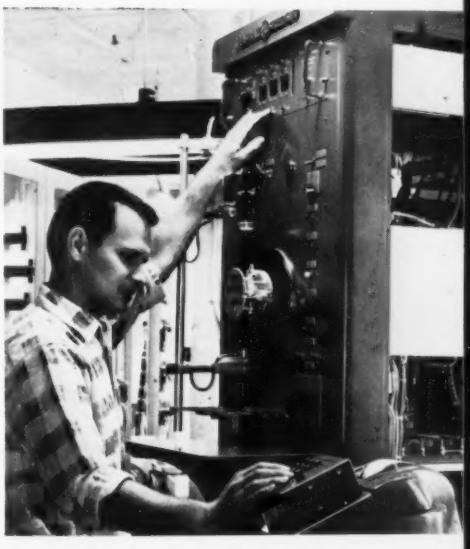
"Scotch" No. 70 tape has a thickness of .015 in.; tensile strength of 11 lb/in.; adhesive of 14 oz/in.; electric strength of 10,500 v (700 v/mil), and an insulation resistance of 1×10^6 megohms.

Utility Tests Meters Automatically

A General Electric Co electronic test unit for automatic testing of single-phase, watthour meters recently was placed into service by Duke Power Co. The unit, designed and assembled by GE's meter department, Somersworth, N. H., tests in-service meters.

Completely transistorized, the "ETU" checks meter calibration under heavy, inductive and light loads in less than 1 min. Test results are shown on a visual readout or in digital form on tape. The unit is capable of testing all manufacturers' two-wire and three-wire single-phase meters of "A" and "S" connected type, with accuracy of plus or minus one-tenth of 1%.

(*More News of Manufacturers, p* 90)



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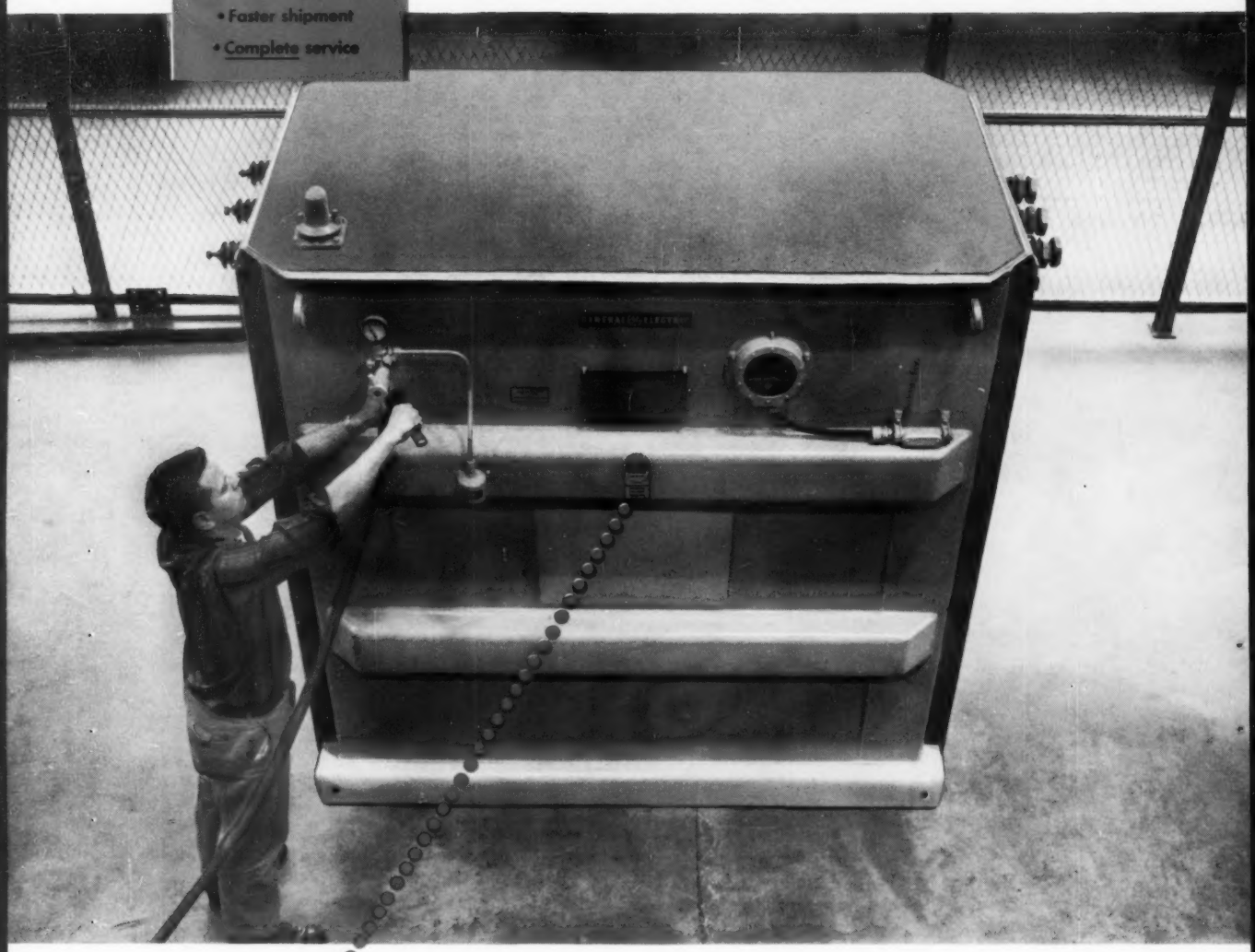

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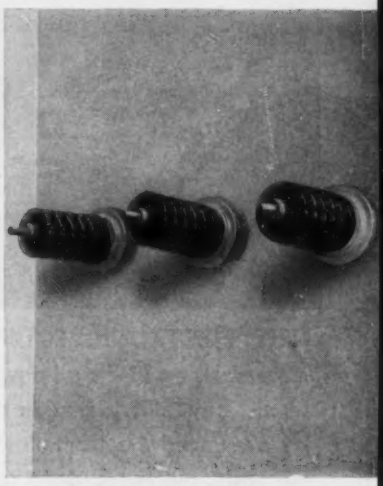

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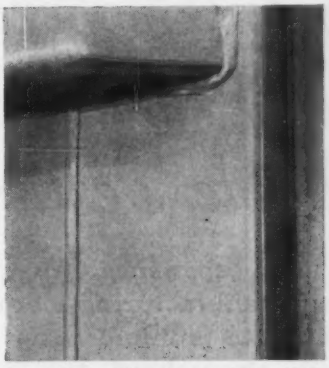

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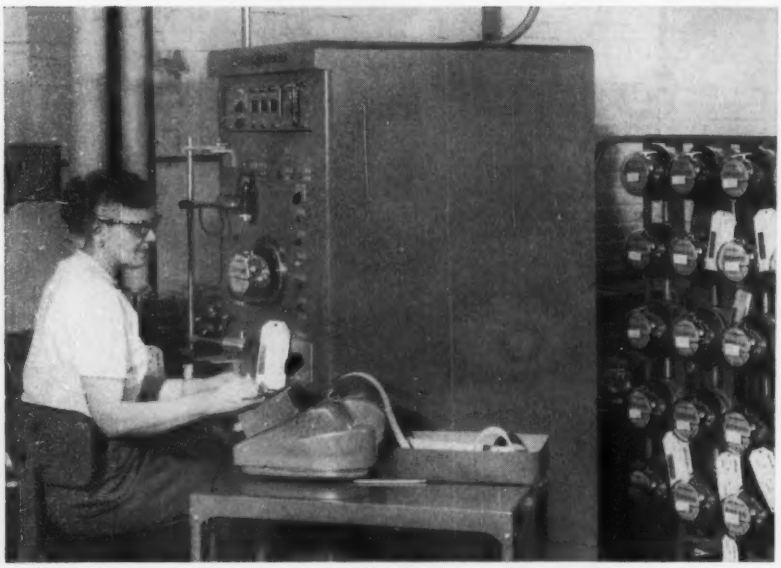
Scientific Sample Testing Saves



NEW ELECTRONIC EQUIPMENT SPEEDS TESTING of watthour meters. Using G-E's all-new transistorized Electronic Test Units (ETU)* almost any utility, large or small, can gain the many benefits offered by advanced electronic testing . . . greater accuracy, reduced testing costs, automatic data collection.

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UTILITY ACCEPTANCE GROWS

Utility regulatory commission acceptance of meter statistical sample testing is increasing. Today, just three years after the breakthrough by a southern utility, more than 21 electric utilities are using sample testing techniques in some form; and 17 regulatory commissions have approved the use of sample testing techniques in their states. In addition, at least 14 others are known to be studying sample testing or are planning to propose it to their commissions. With increasingly large numbers of meters being added to utility systems each year, the number of meters to be tested is rising sharply . . . and testing costs are increasing. It has been proved that statistical sample testing can perform this testing operation with a tremendous saving in time, money and material.

Utilities, G.E. Cooperate to Advance Practice of Meter Sample Testing

General Electric, with long experience in statistical sample testing in meter manufacturing, is working closely with electric utilities to promote better understanding of this practice throughout the industry.

As a pioneer in statistical sample testing of meters—over 10 years, experience in the application of sampling techniques to meter manufacture—General Electric is cooperating with electric utilities to facilitate wider acceptance of this economical and efficient meter testing method.

For example, sample testing seminars—cooperative informational programs conducted by General Electric for over three years—make available to utility metering personnel a wealth of information on sample testing and proved statistical techniques gained from years of practical application of sampling to meter manufacture.

In addition, through the publication of articles, informational bulletins and other data, General Electric has contributed its knowledge of sample testing and sampling techniques to the electric utility industry.

As a leader in meter design and manufacture, it is General Electric's goal as a major supplier to provide electric utilities with the products necessary to make sample testing feasible—highly reliable, advanced-design meters that are certified for uniform accuracy and performance. With over 12,000,000 magnetic suspension meters in service without a reported bearing failure, this goal is now a proved reality.

In General Electric's meter laboratories at Somersworth, N. H., research is progressing on the meter of the future. Here, design innovations, new materials and manufacturing processes are under constant study and evaluation to provide utilities with the greatest possible value for their meter dollar.

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CERTIFICATION: Key to Statistical Sample Testing

Meter accuracy and performance are prerequisites for statistical sample testing. For more than 10 years, General Electric single-phase magnetic-suspension meters have been certified for accuracy and performance. Average accuracy is within 0.1% of reference kilowatt hour (average accuracy of each meter is within ±0.45% of this average); and G-E meters are certified 99.9% free of defects which might cause improper registration or operation. This is reliability, proved by over 12,000,000 G-E magnetic-suspension meters in service without a single bearing failure.

Annual Savings of $600,000 and $400,000 Estimated by Utilities After First Year's Operation of Meter Statistical Sample Testing

SOMERSWORTH, N. H.—Greatly reduced testing costs resulting from meter sample testing were dramatically highlighted recently as two large electric utilities estimated their first year's savings. The results: a combined savings of over $1,000,000 as testing costs were reduced over $600,000 in one case, and $400,000 in the other.

Sample testing is basically the use of statistical methods to analyze and evaluate a group of similar meters from a properly selected sample.

Elimination of mass testing means that utilities can put their testing dollars to the best possible use—necessary testing is directed to groups of meters where it will do the most good. For example, modern meters are sample tested only to verify their continued performance, while older meters are given the amount of testing necessary to insure their accuracy is up to required performance standards.

In addition, the savings made possible by use of sample, rather than mass testing, can be used to mass-test existing older meters and to upgrade the entire utility metering system by replacing old, substandard meters.

This proved performance of statistical sample testing—which has also been used successfully in mass-production industries, government agencies and the U.S. Military Services—could provide the necessary impetus to accelerate its widespread acceptance by the entire electric utility industry.

The findings of the two utilities also point out another important aspect of statistical sampling. There is no "one best method" to sample test meters; there are many, depending upon the information desired. Each sampling plan must be designed to meet the needs of the individual utility.

Statistical sample testing is now gaining wider acceptance. As additional experience is gained in its use and application, continued advances will be made—advances that could mean even greater savings for the electric utility industry . . . a possible $70,000,000 annual savings in meter testing costs in just 10 years through the universal use of scientific meter sample testing.

Sampling's Goal: OPERATING COST BREAKTHROUGH IN METERING

Properly applied to watthour meters, statistical sample testing is a tool which can help the electric utility industry achieve a primary goal: more accurate metering at less cost. The use of established sampling techniques in the testing of meters—rather than 100% initial and periodic testing—enables meter maintenance operations to be programmed and concentrated on those types or groups of meters which are found to perform outside acceptable limits. Thus, unnecessary testing—and unnecessary testing costs—of many thousands of accurate meters is eliminated. These savings resulting from sample testing can be applied to retiring and replacing old, inaccurate meters and mass-testing older meters that require such accuracy check—to raise the performance level of the entire system. And, the data gathered through the use of sample testing plans will provide more explicit and accurate information about meter performance, giving meter engineers the facts necessary to provide for the most efficient operation of their metering plant.

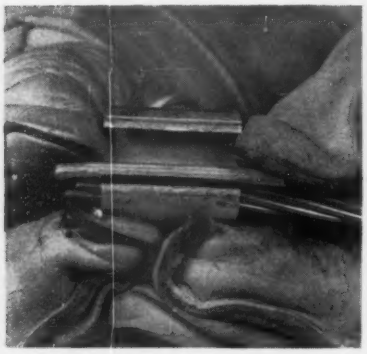
713-06

METER DEPARTMENT

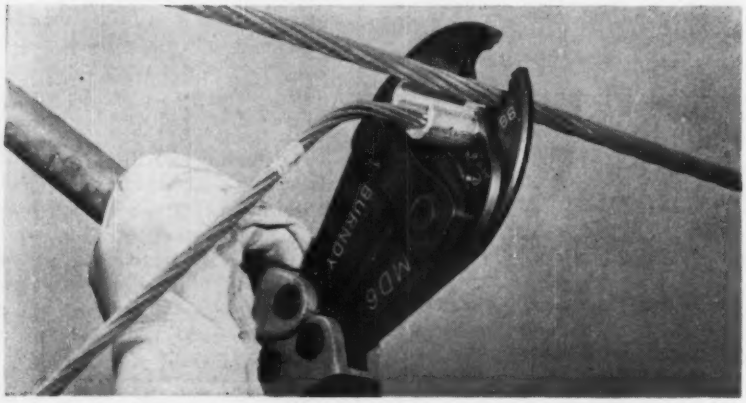
GENERAL ELECTRIC

Distribution Connector-Tool Set Developed

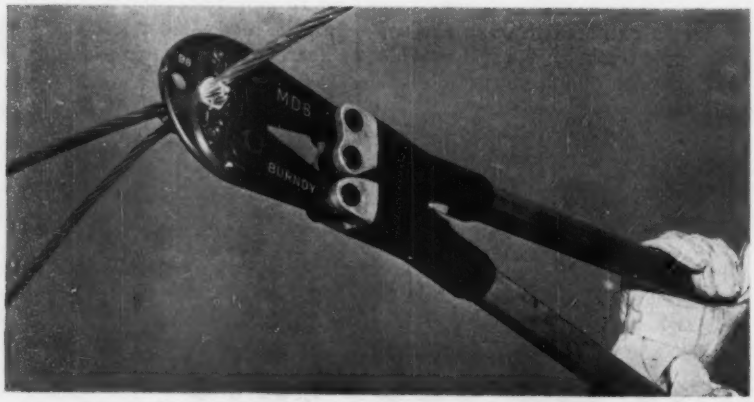
A new reversible compression tap connector and a new insert-die tool developed by Burndy Corp will facilitate overhead distribution-line installation and maintenance. It is reported that the new connector, used in conjunction with the new MD6 Hytool, reduces connector inventories and simplifies installation procedure, while assuring the distribution connection stability.



CRIMPIT CONNECTOR is first locked on the tap; then, inserted into tool jaws



TOOL-CONNECTOR-TAP assembly is placed on run. Connector is crimped . . .



. . . on tap and run. Note that lineman's two hands are free for crimping task

The reversible connector is for a broad range of run and tap conductors, and the new tool is to install this and other overhead-line connectors, including full-tension splices. The connector is called the Cabelok Crimpit because it is, in effect, an outgrowth of Burndy's original C-section Crimpit compression tap connectors.

The adjustable spacer of the new connector plays a key role in its performance. It makes the connector reversible: Either groove may be used for run or tap. Because the spacer's position is adjustable, each connector size will accommodate about twice as great a range of conductor sizes as existing tap connectors. For instance, one connector size (YP26AU2) will take five conductor sizes in each groove.

The adjustable spacer can lock the connector to the tap or to the run before crimping, so that there are fewer units the lineman must hold as he makes the connection.

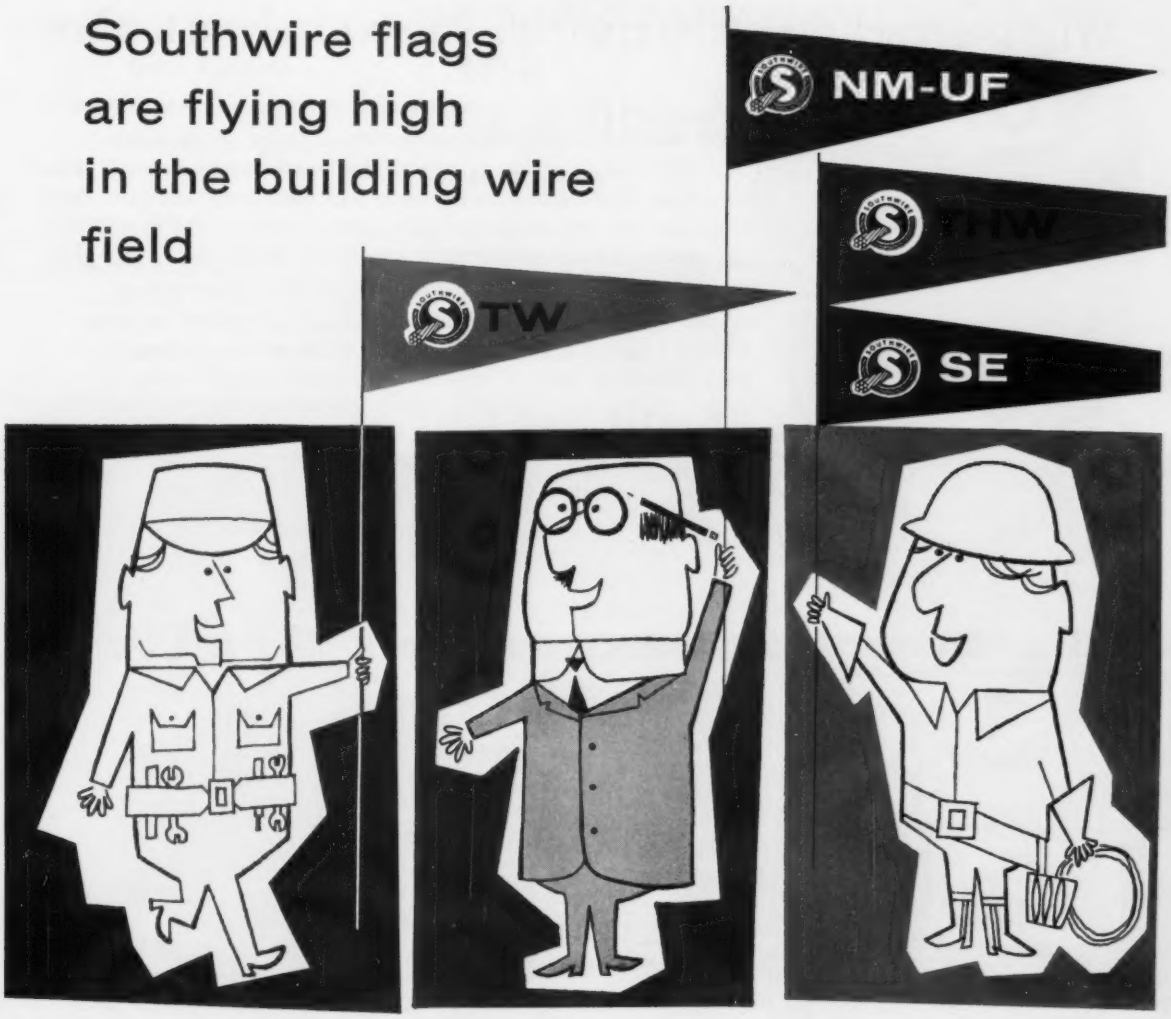
Installed connections meet EEI's existing cycle performance standards and are also virtually unaffected by corrosive atmospheres as verified by test reports. Electrical stability is attributed to the "mass anode" principle applied in the design of these connectors, and to the extended, overhanging spacer which increases the physical separation of run and tap. This design effectively prevents galvanic action, even with aluminum-to-copper connections.

All sizes of Cabelok connectors may be installed with standard 0 and D dies in existing tools or in the new "Hytool." This one tool can make overhead-line tap connections on conductors from No. 6 through 4/0, using one insert die.

The tool is said to be unusually rugged. Samples tested, under full load, beyond 90,000 crimps, showed no wear and required no adjustment. Yet low-friction design makes crimping action relatively easy for the lineman. A cast-aluminum handle frame keeps the weight of the entire tool down to 5½ lb.

(*More Manufacturers News, p* 93)

Southwire flags are flying high in the building wire field



COMPLETE LINE—FULL RANGE OF SIZES—ALL UL APPROVED

(Also available: MACHINE TOOL & APPLIANCE WIRE, FIXTURE WIRE, TELEPHONE WIRE)

In the warehouse or on the job, Southwire building wire is preferred because it is top quality wire that is extra easy to handle. It is manufactured to National Electrical Code specifications and packaged with the folks in mind who sell and use it. Order any of these quality Southwire products and get fast Southwire deliveries — direct by our own trucks.

- Bare and Weatherproof Copper and Aluminum Line Wire
- Neoprene, Polyethylene, and VWP* (Vinyl) Weatherproof Copper, Aluminum and Triplex
- U.R.C. (DBWP, TBWP) Copper
- Copperweld® Conductors
- Copper and Aluminum Building Wire
- ACSR and All Aluminum Cable
- Galvanized Steel Guy Strand and Static Wire
- Aluminized Steel Guy Strand and Static Wire
- Aluminum Alloy Wire
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SOUTHWIRE serves the world

When so much depends on so little, it pays to rely on the best

Now you can install a *dependable* digital computer system in your power plant, or in your system operations center. With it, you can *safely* move forward to *precise* plant performance analysis, plant control or system automatic economic dispatch, billing, and associated functions. Not only does this L&N system give you the speed, accuracy, and reliability of *L&N* solid state electronics, it also gives you the benefits of L&N experience in low-level measurement technology, instrumentation, and control for the *power* industry. Contact your L&N Field Engineer, or 4938 Stenton Avenue, Philadelphia 44, Pa.

LN3000

Digital computer-control systems

LEEDS & NORTHRUP *Pioneers in Precision*

Houma Buys 12-Mw Turnkey Gas Turbine Peaking Unit

A 12-Mw Econo-Pac gas-turbine power plant has been purchased by the City of Houma, La., from the Westinghouse Electric Corp steam division. The new self-contained automatically controlled unit was sold on a "turnkey" basis. The complete "package" will be semiportable, with prefabricated construction, and it will be used primarily for a low-use-factor peaking service of about 1,000 hr per yr. The unit is capable of continuous service if required.

Houma, located in the heart of the "gas country" southeast of New Orleans, will provide fuel for the new plant from its own wells. However, automatic transfer (with no disruption in power production) to distillate oil fuel is provided in the event of failure of the gas system. It is reported that the entire Econo-Pac plant requires only a flat concrete-slab foundation approximately three ft thick, plus electrical and fuel connections—the unit can be in operation less than two weeks after delivery to the site.

Evaporative inlet air coolers can be used to maintain full generating capacity when the dry-bulb air temperature exceeds 80F. When ambient temperature is 40F and below, the output of an Econo-Pac plant is 25% in excess of its 80F rating.

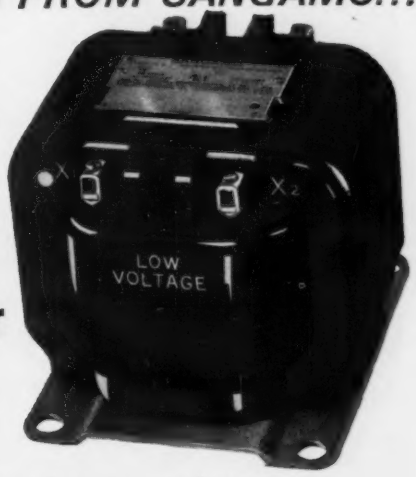
The Econo-Pac line was developed to meet a need for gas-turbine power plants in small "packages"—3, 7, and 12-Mw ratings. It is said they provide a quiet, unattended power source at minimum capital investment. The new units supplement the 22 and 44-Mw gas-turbine power plants available from Westinghouse.

Manufacturers Literature

STANDARDS . . . Testing Insulation Resistance of Rotating Machinery, No. 43, 16 pages, (Supersedes April 1950 issue), $1; Safety in Alternating-Current Substation Grounding, No. 80, 136 pages, $11.00; Proposed Test Procedure for Noise Measurements on Rotating Electric Machinery, No. 85, 24 pages, 70¢; Proposed Standard Definitions of Base Quanti-

AVAILABLE NOW FROM SANGAMO...

the smallest, lightest T-6 potential transformer of its kind

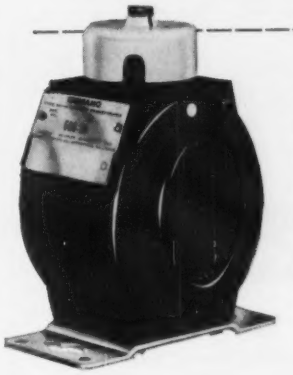


First the BH-6 current transformer . . . and now, a companion potential transformer—the T-6. Compact, epoxy-molded and encapsulated for indoor-outdoor 600 volt class service. Accuracy classification is 0.3 at W and X burdens; actually, the design allows 0.3 accuracy for burdens of two watthour meters, phase-shifting transformer, and demand register (approximately 35 volt amperes).

Impulse level of the T-6 is well in excess of 10 kv full wave, yet it weighs less than 14½ pounds. Liberal cross-section in the secondary winding accounts for a thermal burden rating of 500 volt amperes at 30°C ambient.

The T-6 is small. It measures only 5¾" x 5¼" x 4½". Standard ratios are completely color-coded as follows: 2:1, red, 2.5:1, yellow, 4:1, blue, 5:1, gray. It's built to last, too . . . right down to its alondined and painted aluminum base. Naturally, it meets all of the applicable NEMA standards for indoor transformers of the 600 volt class.

Our suggestion: check full particulars of the T-6 with your Sangamo Representative.



Sangamo BH-6 current transformers lead their class, too. Use them . . . take full advantage of their dual-range feature (a Sangamo first). Eliminate transformer changeouts due to load growth.

BH-6 transformers are epoxy-molded, color-coded, completely encapsulated, lightweight. Large conductor goes through that *Big Hole* easily. Available for all indoor or outdoor applications in a rating for your specific need.

SANGAMO ELECTRIC COMPANY
SPRINGFIELD, ILLINOIS

PX61-1

WHAT A DIFFERENCE!

What a beautiful difference
P & K ALL-ALUMINUM
LIGHTING STANDARDS
can make in any community

You're looking down Broadway, the main business street of Needles, California. Ordered by the City Council as part of a relighting program, the installation, made by the California-Pacific Utilities Co., consisted of twenty seven P & K 30 foot tapered aluminum lighting standards. As you can see from the photos above, the difference is immediately apparent. The result is greater safety for the community at night and the beautiful modern appearance of the new standards by day. Of course, no painting ever required. Why not write for P & K's new brochure ALS-5 for a wealth of helpful information in your street lighting plans.

P&K

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Branch Sales Office: San Jose, California
In Canada: Powerlite Devices LTD., Toronto, Montreal, Vancouver
Export Representative: Philips Export Co., N. Y., N. Y.

ties for Alternating-Current Rotating Machines, No. 86, six pages, 50¢; American Standard Interrupting Rating Factors for Reclosing Service on Power Circuit Breakers, C37.7-1960, three pages, 40¢; and American Drafting Standards (Electrical) Section 15, 20 pages, $1.50. American Institute of Electrical Engineers, 33 W 39 St, NYC 18.

HV CAPACITOR BANK . . . design factors, includes tables for proper selection of rating of standard capacitor units and their connection for a variety of system voltages. Other tables show proper number and arrangement of units for the bank kilovars required. Five tables and discussion provide premises normally used in making factory recommendations of capacitor banks for normal operating voltages from 4,160 to 248,170 v and system requirements from 75 to 108,000 kvar. Line Material Industries, McGraw-Edison Co, Milwaukee 1, Wis.

TRANSFORMER COATING . . . vinyl, for exterior, called Armortec, replaces paint on all R T & E pole-type distribution transformers. Data on mechanical, chemical and electrical properties, also the process involved in fusion-bonding the vinyl to the transformer tank, cover and band. Armortec transformer protection on all R T & E pole-type transformers is available at no additional cost. Concentration, Winter 1961 issue, six pages. R T & E Corp, 1900 E North St, Waukesha, Wis.

ALUMINIZED WIRE STRAND . . . multi-purpose, hot-dip, known as Bethalume Strand. It is used for messenger strand, guy strand and overhead ground wires. Made of steel wires to which aluminum coating has been applied, this bimetallic combination provides high strength of steel with the corrosion protection qualities of aluminum. Normally made in 7-wire construction, it is also available in 3-wire construction in certain sizes of utilities grade. Folder No. 777, four pages. Bethlehem Steel Co, Inc, Bethlehem, Pa.

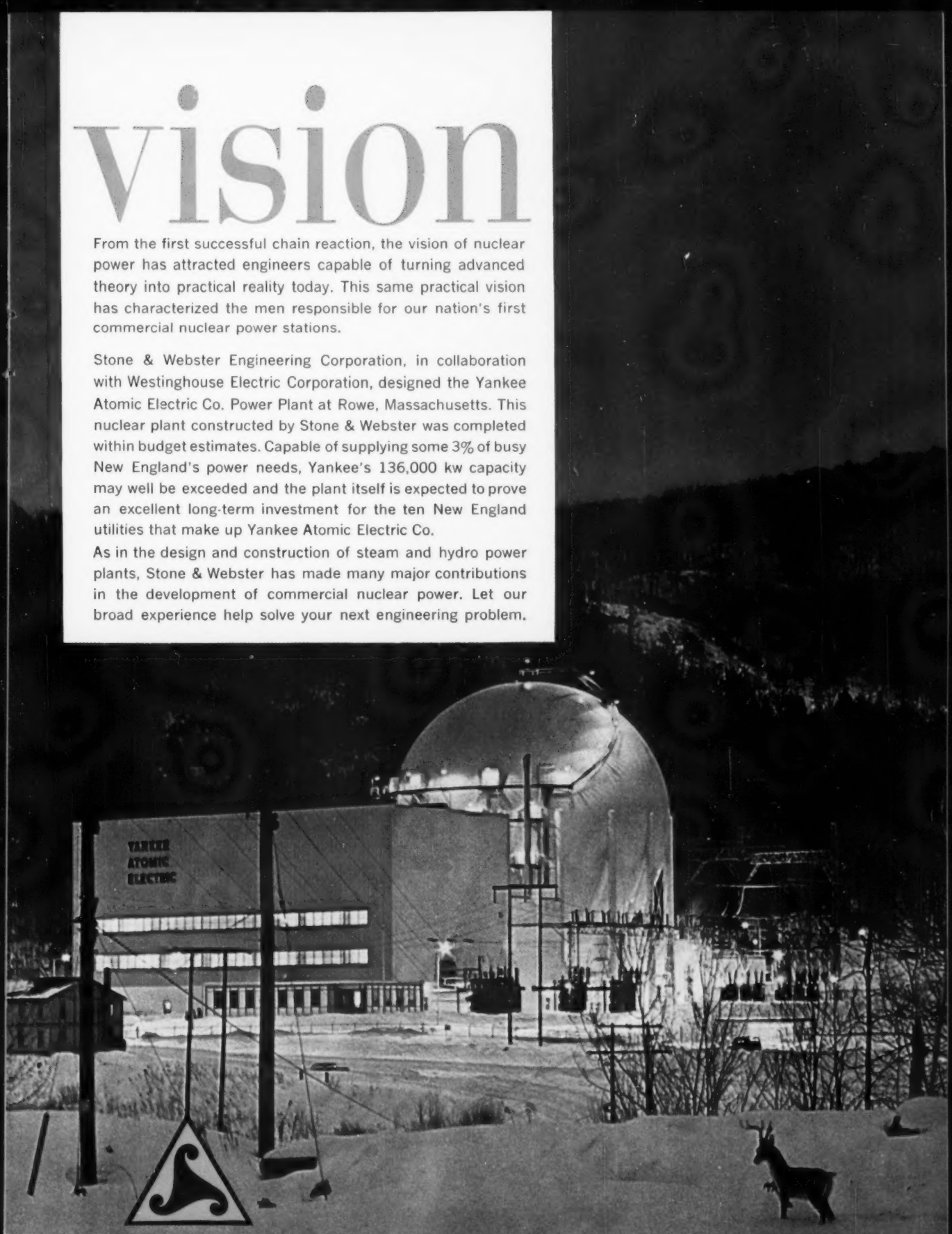
COPPER ALLOYS . . . check list for electrical conductivity ratings of 56 copper alloys. Available mill shapes for each alloy (sheet, rod, wire, tube) and typical uses in electrical and electronic apparatus, based on physical and mechanical property characteristics. Bulletin, "Bridgeport Metals for Electrical and Electronic Apparatus," eight pages. Bridgeport Brass Co, 30 Grand St, Bridgeport 2, Conn.

vision

From the first successful chain reaction, the vision of nuclear power has attracted engineers capable of turning advanced theory into practical reality today. This same practical vision has characterized the men responsible for our nation's first commercial nuclear power stations.

Stone & Webster Engineering Corporation, in collaboration with Westinghouse Electric Corporation, designed the Yankee Atomic Electric Co. Power Plant at Rowe, Massachusetts. This nuclear plant constructed by Stone & Webster was completed within budget estimates. Capable of supplying some 3% of busy New England's power needs, Yankee's 136,000 kw capacity may well be exceeded and the plant itself is expected to prove an excellent long-term investment for the ten New England utilities that make up Yankee Atomic Electric Co.

As in the design and construction of steam and hydro power plants, Stone & Webster has made many major contributions in the development of commercial nuclear power. Let our broad experience help solve your next engineering problem.



STONE & WEBSTER ENGINEERING CORPORATION

A Subsidiary of Stone & Webster, Inc.

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Why Use Potheads?

Because—— Potheads are the best way yet devised to terminate cables.

Why?—— Only a pothead provides a grounded, hermetically-sealed metallic housing over the bare cable for effective protection against weather and corrosive atmospheres. Extra insulation between conductors and to ground is built up in potheads with dielectric materials of high strength, amply protected by the housing against deterioration. Mechanical seal of cable to pothead is excellent, making it easy to secure cable termination solidly.

True—— There are other methods of terminating a cable. These are good and may be entirely adequate for certain conditions. But only a pothead has the extra characteristics that pay off in best service over the years.

What Extras?—— Potheads are best because they have extra features to enhance life, reliability, and continuity of service, while requiring minimum maintenance. They have extra stamina, too, for the difficult situations and for emergencies such as switching and lightning surges, corrosive salt and industrial fumes, and unusual cable-support problems.

G&W—— Standardized potheads covering 80 percent of uses are available for fast off-the-shelf delivery. Other potheads are available for special uses or can be designed for even the most unusual cases. Other types of termination are also available. Write G&W about your problem or contact your nearest sales representative. Data is available on both standard and special-use potheads upon request.

G&W ELECTRIC SPECIALTY COMPANY
3500 WEST 127TH STREET • BLUE ISLAND, ILLINOIS
Canadian Mfr. • Powerlite Devices, Ltd. • Toronto, Montreal & Vancouver

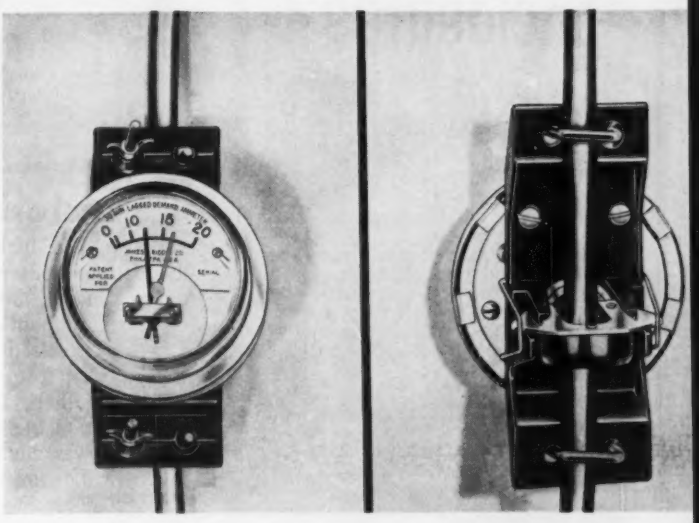
superior quality standards — inspired specialized design

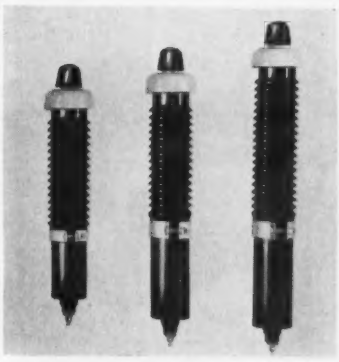
A61-1

Transformer Load Indicator . . .

. . . provides a relatively simple means for indicating distribution transformer loading. Device is a demand ammeter which (at ambient temperature of 67F) indicates 95% of magnitude of current during a 30-min lag period. Indicating pointer follows current changes; red maximum reset pointer shows maximum value obtained since last reset. Red pointer is reset by passing a magnet across face of glass cover of the instrument. Indicator is attached by securing two J bolts and snapping laminated core into place; core fits over the conductor and seats firmly against back of instrument case. No electrical connections or disconnections are needed. Unit shown has 20-amp full scale for use on 25-kva transformers (2,300-v primary). Higher ratings for heavier loaded primaries and for the secondary side will be available later.

James G. Biddle Co, Philadelphia, Pa.





Lightning Arresters . . .

. . . afford improved discharge voltage and stable and consistent sparkover characteristics without sacrifice of proved life expectancy. Type E5 direct-connected arresters and T5 externally gapped arresters are offered in standard voltage ratings of 1 through 20 kv. Use of porcelain housings achieves low creepage distances, permitting assembly of improved gap and valve components into short, lightweight units of rugged construction. Moisture-proof seals prevent internal contamination and minimize radio interference. An integral part of the direct-connected arresters is the L-M Isolator, which automatically disconnects and indicates damages to arresters, preventing permanent line-to-ground faults.

Line Material Industries, McGraw-Edison Co, Milwaukee 1, Wis.

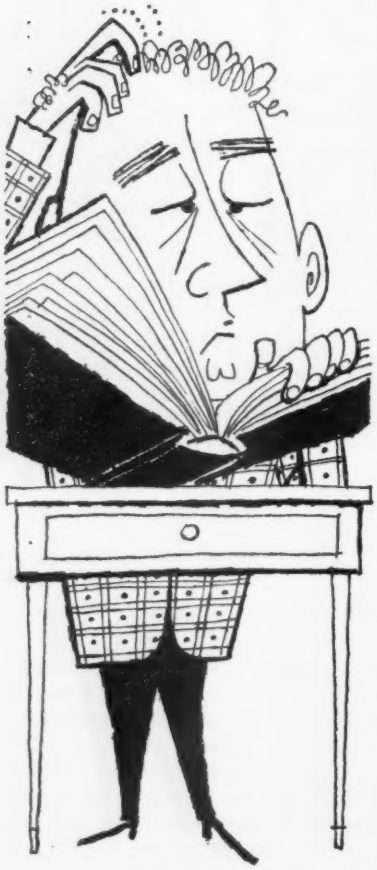
Silicon DC Power Supplies . . .

. . . cover industrial applications from 0.75 to 75 kw, available in 13 ratings. New line is divided into three basic rectifier groups for versatility of application: general-purpose, essential service, and synchronous-motor field excitation units. Silicon cells, which convert ac to dc, are protected against faults on the load and source side of the equipment through current-limiting fuses utilized by the convection-cooled power supply units. Operating efficiency of the rectifier units is nearly constant at 96% from ¼ to full load for units rated 25 kw and higher; below 25 kw, efficiency decreases gradually to about 95%. Units rated up to 4.5 kw, 125-v dc and 9 kw, 250-v dc are available in wall-mounted enclosures. From 6.5 kw, 125-v dc to 25 kw, 250-v dc, units are available in floor-mounted enclosures.

General Electric Co, Schenectady 5, N. Y.

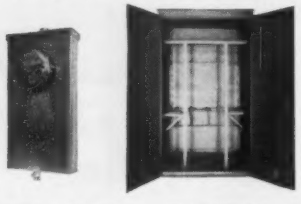
(*More New Equipment on page* 98)

Searching for Enclosures?



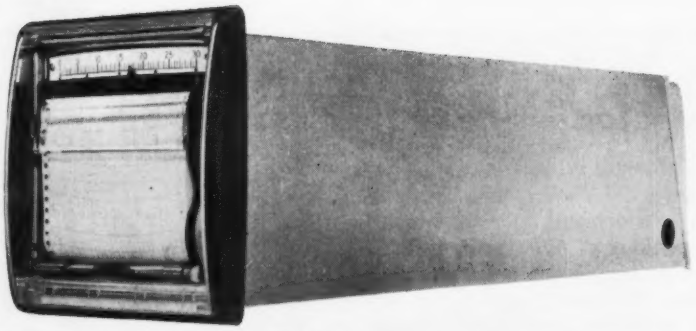
look to...

SUPERIOR
SWITCHBOARD & DEVICES CO.
CANTON 1, OHIO
A Subsidiary of
The Union Metal Manufacturing Co.



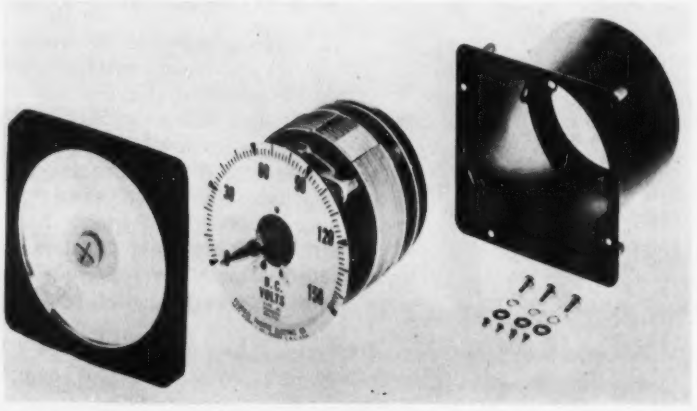
Convert-A-Socket Meter Booth

Write for a free Catalog outlining types and sizes of enclosures, reactiformers, test switches, test blocks, and meter socket equipment.



Transistorized Telemeter System . . .

. . . provides high-scanning speed and more sensitivity to rapidly fluctuating measurements through its standard 2-sec cycle, which offers almost continuous telemetering. Receiver instrument (above) is a panel-mounting strip-chart recorder with plug-in components and transistorized amplifier, which, located up to several hundred miles away from the transmitter, receives pressure, temperature, flow and other variables transmitted by electrical impulses. Three types of transmission links may be employed: leased telephone or private 2-wire lines; high-tension power lines; or audio frequency or microwave channels. Indicating, recording and control functions may be located at receiver or transmitter. The transmitter uses a photodiode detector to scan input position and operate sealed dry-switch contacts. The electronic system has few moving parts, no mechanical cams, no clutches, and no mercury switches.
Foxboro Co, Foxboro, Mass.



Switchboard Instruments . . .

. . . have 250-deg-arc pointer movement on a 7-in.-long scale. Accuracy is 1% of full-scale value. Type JA ac, Class 9117 and Type JD dc, Class 9116 are for applications in control and distribution switchboards in instances where quick and accurate readings at considerable distances are required. The dc instruments (ammeters and voltmeters) employ a high-strength Alnico magnetic system, a rugged moving element in a shock-mounted case. The ac devices are: ammeters, voltmeters, wattmeters, varmeters, and frequency meters. Instrument ranges are: ammeter, 5-amp coil or self-contained to 20 amp; voltmeter, 150-v coil or self-contained to 800 v; and wattmeter, 5-amp, 150-v coils. All units meet ASA 39.1 and NEMA EL1 1959 standards. Custom-made models are also available. Panel size is 4½ in.
Federal Pacific Electric Co, 50 Avenue L, Newark 1, N. J.

(*More New Equipment on page* 100)

this new 'echelon' lap-on-top core*...

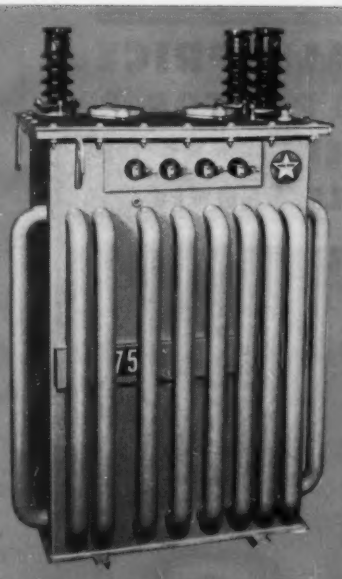
*Service-proved in single-phase Pole Star Transformers

EXAMPLE: In the case of the three-phase Pole Star Transformer shown (75 kva, 12,000△—208Y/120 volts), Pennsylvania's patented, echelon lap-on-top core *reduces exciting current by 81%*, compared with the previous design. Test results also show a 10% decrease in impedance . . . and improvements in other electrical characteristics.

Overall height has been reduced 9% . . . width, 11%. Weight reduction as a result of the improved core and new space-saving rectangular tank totals 200 pounds.

It will pay you now, more than ever before, to check Pennsylvania on three-phase distribution transformer needs—whether for pole, platform or substation installations. The new Pole Star design is available through 500 kva, 15 kv. Contact Distribution Sales, Pennsylvania Transformer Division, McGraw-Edison Company, Canonsburg, Pennsylvania.

McGRAW-EDISON

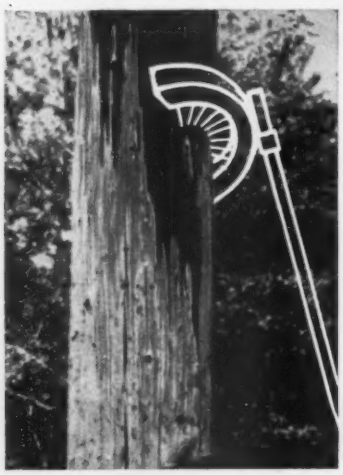


...in this new rectangular tank...

reduces overall size, weight and height of three-phase Pole Star® transformers by 10% ...and improves operating efficiency!

PENNSYLVANIA POLE STAR **distribution transformers**

SMALL PRICE TO PAY FOR ADDED YEARS OF POLE SERVICE



GET PLUS-PROTECTION with POLE SPRAYERS' THOROUGH TREATMENT

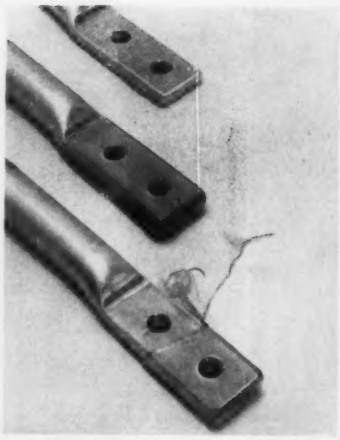
Pole preservation doesn't stop at the groundline. Once this critical zone has been protected, the above-ground portions of standing poles then become the next most important areas to protect for climbing safety, continuity of service and pole economy.

Pole Sprayers' standard service includes a climbing inspection by trained field crews . . . location of internal decay spots . . . moisture content readings . . . the use of proven preventatives . . . double application to the top 6' of the pole and special attention to checks and spur-cuts. Quality control of preservative retention is furnished at no extra charge by sampling and laboratory analyses, not later than 30 days after treatment.

Records prove that keeping even a small number of older poles on the job safely and efficiently more than pays for a planned inspection and treatment program. For full information, write: POLE SPRAYERS, INC., 991 Ellicott St., Buffalo 9, N.Y.

Pole Sprayers Inc.

SERVING UTILITIES SINCE 1935



Conductor Terminals . . .

. . . **are guarded by cellulose dip coating** on ground pad surfaces to prevent shipping, storage and handling damage and provide a "near-perfect" electrical contact for bolted connects. Possible contact between terminal pads and dirt or oxidizing conditions which normally would make repeat installations necessary is said to be eliminated. Coating may be obtained on any Alcoa/Rome compression terminal (covering AWG No. 2 through 1,590,000 cm ACSR, and comparable sizes of stranded aluminum conductor). Applied as standard protection to the company's EHV conductor accessories, it is optional on other accessories.

Rome Cable Division, Aluminum Co of America, Rome, N. Y.

Heat Exchanger Tubes . . .

. . . **feature new-type alloy,** offered in annealed state to permit close U-bands. Alloy has maximum allowable stress value in tension of 15,200 psi at 600F, said to exceed stress values of some more expensive metals. The 707 heat exchanger tubes are of copper-nickel-iron-manganese and have 1,250C melting point. Typical tensile strengths are quoted at 84,700 psi for ⅝-in.-OD tubes and 88,000 psi for ¾-in.-OD tubes—both sizes with 0.049-in. walls.

Anaconda Co, 25 Broadway, New York 4, N. Y.

FOUND!

How To Keep Street Lights Burning

Take a simple, lightweight, compact photo control. Use Varistors in conjunction with the secondary lightning arrester.

RESULT: You eliminate the one biggest cause of photo control failure... transient voltage surges which are *below* the spark-over of lightning arresters.

That's LUMATROL MARK I...completely reliable! It withstands ALL transients up through the capability of the secondary arrester!

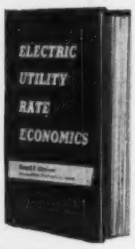
WRITE FOR BULLETIN 91a.

MICRO BALANCING, INC.
GARDEN CITY PARK, N. Y.

In Canada: J. R. KEARNEY CORP.
Box 270, Guelph, Ont.

How electric utility rates are established—

This book fully covers basic electric utility economics: regulation, competition, earnings, revenues and expenses, public and employee relations, etc. Appropriate charts, diagrams and tables help provide detailed analysis of the price structure and its end result, the tariff, or practical means of charging for service. The principal rate classes, forms, and schedule provisions in use today are described and there are worked-out examples of bill calculations and fuel cost adjustment.



ELECTRIC UTILITY RATE ECONOMICS
By Russell E. Caywood

Manager of Rates, West Penn Power Company

236 pages, 6 x 9, 60 charts and tables, $10.00

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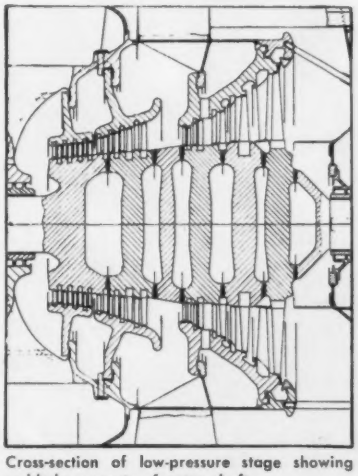
Welded sectional rotors for steam turbines

By N. K. Halsteen, Project Engineer, Brown Boveri Corp.

BROWN BOVERI

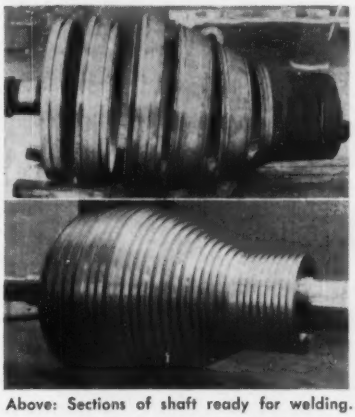
The manufacture of large, solid, one-piece rotors presents problems in detection and inspection of flaws, often resulting in the difficult choice of scrapping an expensive forging or completing the rotor with a "patch" or with an internal flaw whose effect in operation cannot be predicted with certainty. In use, the mass of a solid rotor also causes difficulty in maintaining tight shrink fits for the wheels and prevents uniform heat distribution for short start-up or shut-down schedules.

To avoid these difficulties, Brown Boveri developed a rotor made of forged discs and hollow, bell-shaped end sections welded together at the rims, forming a light, strong, rigid unit.



Cross-section of low-pressure stage showing welded segments of rotor shaft.

How Brown Boveri sectional rotors are made



Above: Sections of shaft ready for welding.

Below: The shaft after welding, heat-treatment and machining.

The rotor is assembled vertically on a turntable, the sections being centered by spigots. As the workpiece rotates past welding heads, the butting surfaces are welded. Welds are made at several points around the section at the same time—to prevent distortion. The welding is done automatically by the tungsten inert-gas process . . . providing homogeneous welds free of slag.

After a few layers of weld, the root is checked with gamma rays. If approved, the welding is completed.

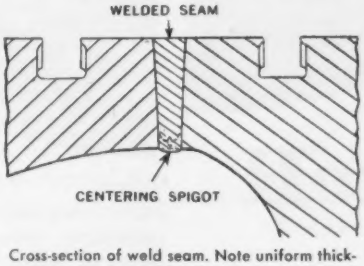
After a final ultrasonic test, the welded area is given stress-relief heat treatment, with the rotor in vertical position. Machined rotors are tested at 40% overspeed before blading . . . also balanced statically and dynamically after blading.

Advantages of sectional rotors

Because of the relatively small size of each section, forging conditions meet ideal metallurgical requirements. Inspection can be complete. Doubtful sections are scrapped without any attempt at "patching." Possible asymmetries resulting from forging are cancelled by the chance disposition of individual sections.

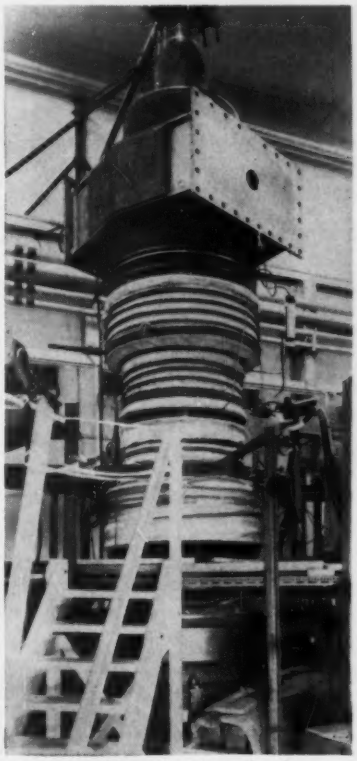
The stress-relieving procedure practically eliminates asymmetrical stresses.

The low mass of the rotor results in a favorable mass ratio between rotor and casing . . . with far less critical expansion differentials during sudden load changes or short start-up and shut-down schedules.



Cross-section of weld seam. Note uniform thickness of rims at weld — for minimum thermal stresses.

As evidence of its sound engineering, the Brown Boveri sectional rotor design has been used for over 30 years in several thousand rotors—and without a single explosion or other serious rotor failure.



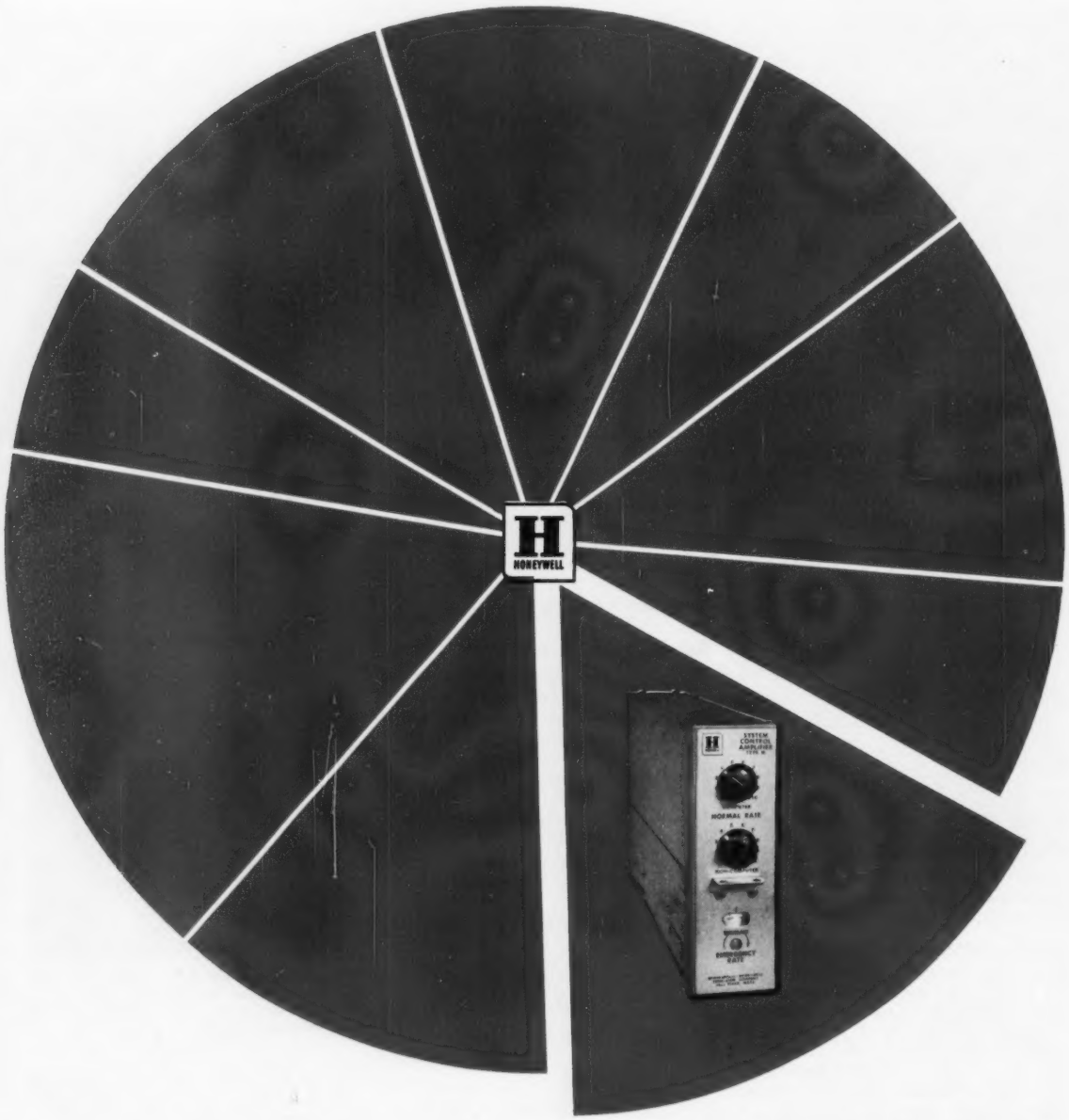
Automatic welding of sections. Also shown are insulating blanket and induction heating cable for pre-heating before welding and stress-relief treatment after welding.

Other features of Brown Boveri steam turbines: an all-hydraulic governing system without rods, levers or mechanical joints subject to wear and resulting inaccuracies . . . and an unequalled reliability of service illustrated by many Brown Boveri turbines built 40 to 45 years ago and still in continuous operation.

BROWN BOVERI Brown Boveri Corp., Dept. EW5, 19 Rector Street, New York 6, N.Y. Agents in 27 U.S. cities

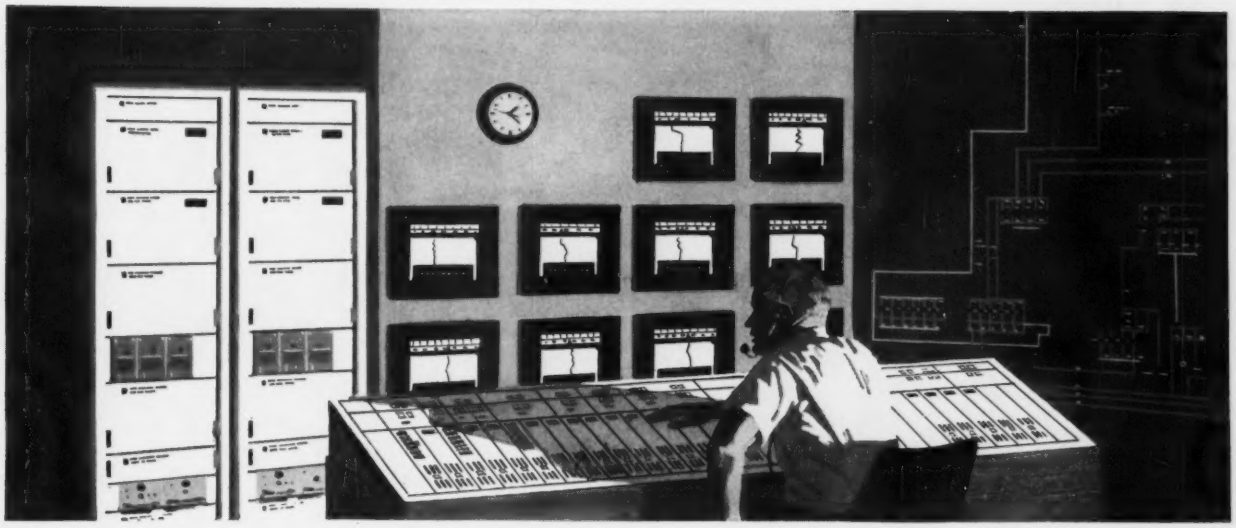
Only Honeywell's new load-frequency system gives you all three:

SOLID-STATE COMPONENTS, RATE LIMITERS



HEART OF THE SYSTEM is this transistorized control amplifier. One basic amplifier performs various computing, measuring, alarm and control functions. Speed of response is easily changed with the turn of a knob. Six amplifiers like this can be mounted in a single standard 19-inch relay rack.

AND COMMAND ACTION



Meet power demands precisely and cut generating costs with Honeywell's new load-frequency control system. It introduces solid state techniques that bring new reliability levels and new performance flexibility and sharply reduce maintenance.

Major components: High-speed, transistorized telemetering equipment transmits tie-line loads to the dispatcher and the command signal to generating stations. Control amplifiers perform computing, measuring, control and high and low alarm functions. Governor motor actuators control generator loading in accordance with command signals. Rate limiters, independent of the control system, hold generation changes within prescribed allowances. Incremental loaders apportion generation on an economical basis.

Easy maintenance: All components are of interchangeable, plug-in, modular design, and are easily accessible while the system operates. Except for relays, *there are no moving parts in the entire system.* Slidewires, motors, gear trains, and vacuum tubes are eliminated. Use of transistors and other solid-state devices throughout cuts space requirements in half and drastically reduces heat buildup. All critical test and calibration points are compactly packaged in a single module, to provide a centralized test area and further simplify maintenance.

Honeywell's new load-frequency control system is a development of first importance in the power industry. For advanced systems, you can add the new Honeywell 290 industrial digital computer to mastermind the system and simultaneously compute cost data for interconnection billing. Get complete details from your nearby Honeywell field engineer. Call him today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Pottstown, Penna. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

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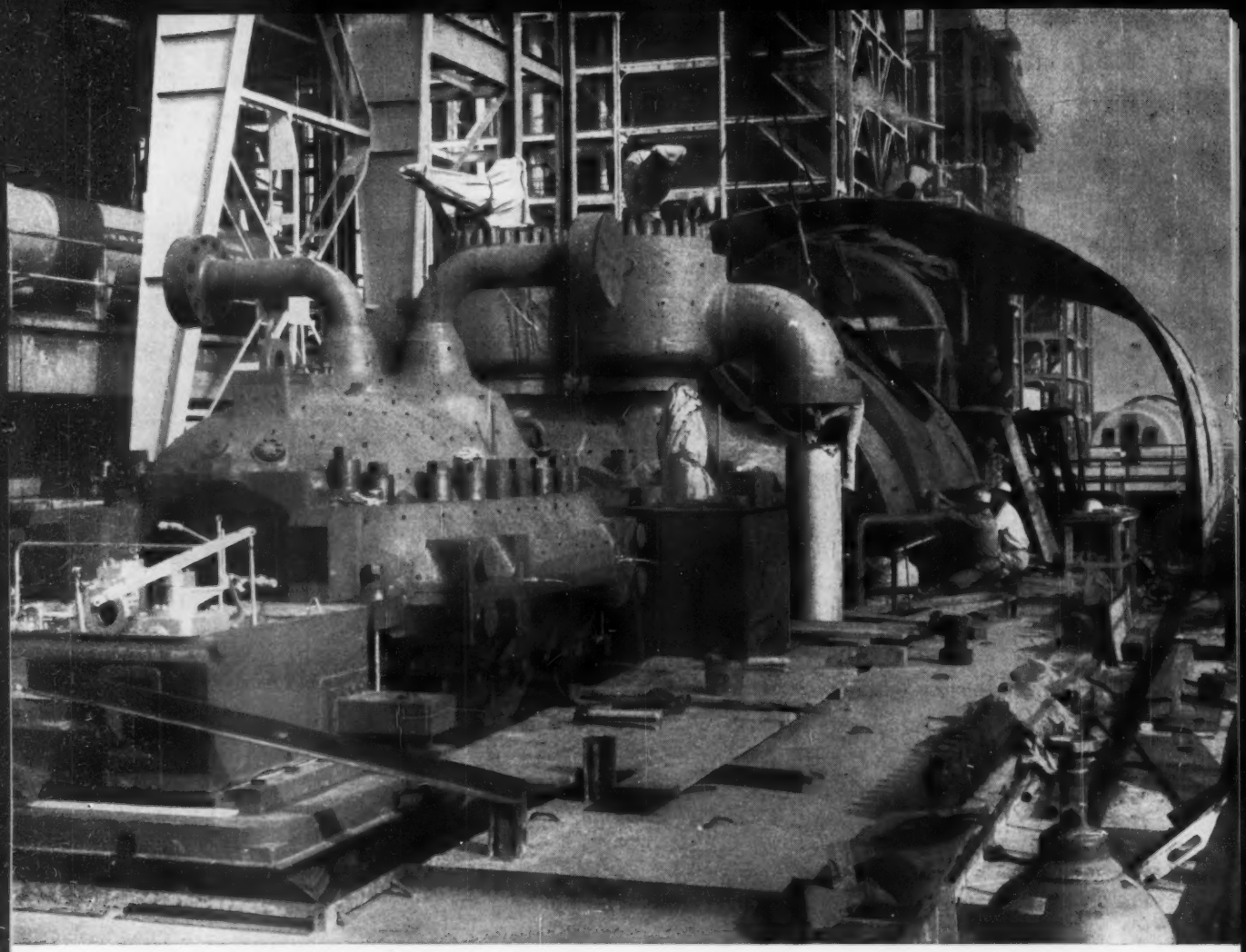
HONEYWELL INTERNATIONAL Sales and Service offices in all principal cities of the world. Manufacturing in United States, United Kingdom, Canada, Netherlands, Germany, France, Japan.



General Electric's experienced turbine-generator service teams have built an unsurpassed record on economical, on-time installations.

Economical, on-time turbine-generator installations don't "just happen"

Thorough planning plus know-how contribute to economical, on-time turbine-generator installations. General Electric's unparalleled record in this area is built on:

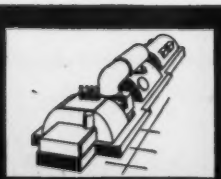
- pre-installation planning with purchasers to program the installation in terms of time, manpower, and scheduling requirements,
- know-how of G.E.'s turbine-generator service teams which provides on-the-job savings and helps keep the installation on schedule, and
- progress appraisals to purchasers which aid in keeping the over-all installation moving smoothly.

When you specify a General Electric turbine-generator you get a unit pre-engineered for economical, on-time installation—and you get personalized service for as long as that unit is on-the-line. 244-08

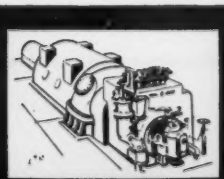
Progress Is Our Most Important Product

GENERAL ELECTRIC

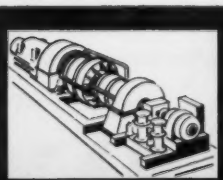
General Electric Turbine-Generators Help Keep Power Costs Low



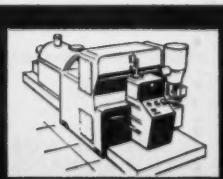
Steam turbine-generators for large blocks of power



Steam turbine-generators 100,000 kw and lower



Gas turbines for peaking, base load, combined cycles

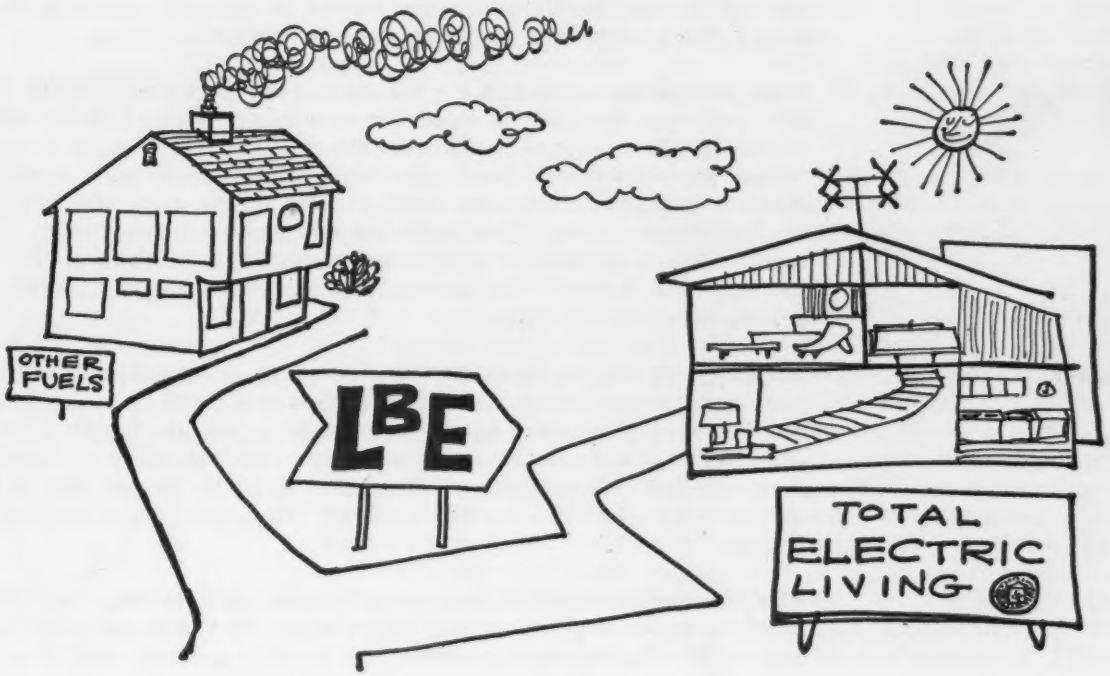


Mechanical drive steam turbines for auxiliaries

Electrical World

MAY 22, 1961

Management Newsletter



LBE—Electricity's National Salesman

Electricity used to be just a light that glowed at the touch of a button, or a wall socket that somehow made toasters hot and refrigerators cold. But lately, electricity has become much more. Now it's venetian blinds that are so clean you can wipe them with a lace handkerchief, and clothes that dry without turning yellow. It's unused space that can be put to work to heat the family's water, and a housewife spending more time with her children. From a household aid, electricity has grown into a way of life. But this didn't happen by accident.

Electricity's new image as an integral part of family life is primarily the result of a $53-million shot-in-the-arm called the "Live Better Electrically" program which combines the talent and effort of the investor-owned utilities, electrical appliance manufacturers, and the Edison Electric Institute. Its purpose, as outlined by W. M. Shepherd, head of the Live Better Electrically Policy Committee, is to sell more residential kwhr by featuring competitive equipment within the total electric living concept, to create customer preference for electric living, and to coordinate the local selling efforts of individual utilities. To reach this goal, LBE has a budget of about $2.6 million a year. Appliance manufacturers spend an additional $20 million annually in campaigns using the LBE themes, and investor-owned utilities sink another $32 million into local campaigns.

The hard sell for electricity began in 1955 when the General Electric Co decided that the industry wasn't doing enough toward developing its residential market. GE didn't plug its own products, nor did it concentrate on pushing sales of particular appliances. Instead, the company took the long-range view, invited participation by the entire industry, and began informing the public of the advantages of total electric living. GE had intended from the start to phase-out the program within a few years, but the industry, recognizing its value, was unwilling to see its message disappear from the public view. Edison Electric Institute seemed to be the logical heir to LBE, and in 1959, it took over the program's national and local promotional supervision. The Medallion Home Program went to the National Electrical Manufacturers' Assn to police the standards, provide promotional material, supply medallions, and prevent their unauthorized use.

During the first year under EEI, the program followed the pattern originated by GE. But during this time, the researchers were hard at work. LBE invested $30,000 in a depth study to determine the state of mind of the American public. "What," they asked in their door-to-door travels, "does electricity mean to you?" Hundreds of families answered the question, and when the results were tallied, two facts became obvious. First, housewives were unwilling to accept appliances simply as labor-saving devices for themselves. They had to be shown that there were benefits for their entire families. Secondly, most people thought of electricity as being clean, safe, and modern.

EEI, along with Compton Advertising Inc, went to work on a campaign that would bring these two factors together. It had to show that electricity means more than "less work for Mother," but rather that it brings countless benefits to the entire family. And it needed a word to tell the public that electricity was indeed clean, safe, and modern. Under the direction of Ralph M. Zeuthen, first chief of the program at EEI, idea after idea was tested. The answer came in one word, "flameless."

What does flameless mean? Housewives say it means just those things that LBE was trying to put across—clean, safe, and modern. They don't put it in just these words. One woman, for example, said flameless electricity won't scorch or dirty the bottoms of pots and pans. It won't put grime on the walls. That's a pretty fair description of cleanliness. But regardless of how they word it, the meaning is always the same. Flameless, which according to *Advertising Age* has a devastating appeal, gets the message across. In fact, *Advertising Age* ranked one ad based on the flameless theme among the ten best ads of the year.

Since hitting on the magic word, the Live Better Electrically program has moved swiftly, and with a definite sense of purpose. Readers of *Life, The Saturday Evening Post, Readers Digest* and *Better Homes and Gardens* have seen time and time again the variety of ways in which electricity benefits the family. And the benefits are spelled out clearly. The ad-men have gotten away from the vague exhortation, "Live Better Electrically," and are putting electric living into sharp focus. One ad tells that electric water heaters, since they need no flue, can be located near the kitchen, in any unused space. The picture shows the heater tucked into the corner of a linen closet. Another ad brings home the advantages of electric heat by showing bookshelves free of dust. Gold Medallion homes are explained by the best possible authorities—the people who live in them. And always the reader is reminded that this better life comes only with electricity by the inescapable message of the word flameless.

Is the program achieving solid results? Just ask the people who ought to know. The vice president of a Southern electric utility says the program "has actually been strengthened in the past two years. The national advertising program has become quite competitive in place of the watered-down version of previous years." Another utility executive feels "the LBE program has made great strides and the impact is reaching into all parts of the nation, selling the advantages of flameless

electrical living." A middle Atlantic electric utility spokesman commented, "The LBE program has united the electric utility industry in a national effort which is of great benefit to local programs." And a Northern combination company executive points out, "LBE gets the message across to our customers in a way no one of us could accomplish alone."

Electric appliance manufacturers too are delighted with the results. George Bogard, who heads up GE's residential market development operation, calls EEI's efforts excellent. "Live Better Electrically is the strongest tool for promotion the industry has ever had," he said. Westinghouse Electric Corp feels LBE is doing an increasingly effective job because it is getting away from the vague "live better electrically, and is specifically pushing total-electric living and electric house heating." The company reports that its electric heating sales have increased substantially, and feels that the LBE Program has contributed materially to this increase.

LBE people are constantly evaluating their own work. They have two measures of its effectiveness. First is a study made by Compton, and second, the reactions of trade allies, and customers. All these report unanimously that the LBE Program is doing an effective job.

But there are a few trouble spots in the program. And ironically, one of them is caused by what most people feel is the campaign's strongest point. This is the word, "flameless." Its use has broken the solid front that EEI hoped would form behind "Live Better Electrically." Many utilities and several of the manufacturers are in two businesses. They're selling gas and electricity, or gas appliances and electric appliances, and they feel that "flameless" discriminates against one of their lines. Some of the utilities have expressed their aims as "to sell energy (electric, gas, steam, or other) in the form best suited to our customers' needs." For this reason, they're luke-warm in their support. Said one combination company, "Until very recently, this company was one of the earliest and staunchest supporters of the Live Better Electrically program. From its inception, when General Electric sponsored the idea, we accepted it fully and contributed according to formula each year until this year. When the National Committee of EEI came up with the theme 'flameless' we could no longer go along with the program. From the standpoint of a utility which sells both electric energy and natural gas, this advertising is very distasteful and completely useless in our local advertising and sales promotion program."

LBE people, however, point to signs that this problem can be licked. More and more combination companies are finding that they can put "flameless" to work. As one such company put it, "Naturally we have problems in carrying out the LBE program at the local level. However, these are not insurmountable, and our company has used the program quite effectively. Our basic philosophy is that we have both electricity and natural gas to sell, and we aggressively promote both services." Apparently others think the same way. A recent survey made by LBE showed that 141 utilities are now using the "flameless" theme in local advertising and sales promotion; 43 of these companies also sell gas. And the number of combination utilities has been increasing right along with the entire program.

Another road-block to full industrial participation has been the very fact that Live Better Electrically is a national program. Some companies feel that they themselves are the best judges of the proper promotional techniques in their own areas, and as one company said, "We can obtain much better results by spending a like amount in our own territory."

But whatever the reason, 61 electric utilities, all members of the Edison Electric Institute, are not now participating in LBE. Naturally, everyone in the program hopes that these companies will eventually see their way clear to full participation.

Their absence hurts LBE in two ways. First, it reduces the scope of the campaign's coverage, and secondly, it puts a sizable dent in Live Better Electrically's funds. If all EEI utilities got behind the program, an additional $780,000 would be available, more than a 30% increase in the program's available funds. Without these companies, LBE's goal for '62 is only $130,000 more than the present budget. EEI realizes that many of the absent companies are beset with real difficulties in swallowing Live Better Electrically. But it feels the over-all benefit to the industry should be the paramount consideration.

In a personal letter to non-participating companies, Sherman R. Knapp, president of EEI, said: "The Live Better Electrically Program is now starting its third year under the sponsorship of Edison Electric Institute. As a member of EEI, I know you are interested in this electric industry effort. Everyone in the industry benefits from the LBE program. No matter what the sales problem, and none of us has the same, all or part of LBE advertising is helping every company's residential sales of electricity. A united, electric utility company effort is needed if we are to continue to compete successfully for customer preference, and the EEI Live Better Electrically program is our best opportunity to fulfill this obligation."

But even standing just as it is, Live Better Electrically enjoys good health. One of its strengths is in its maturity. As E. O. George, vice president of Detroit Edison Co, said, "The problems of launching a program of this magnitude are largely behind us." LBE has more than two years under its belt, and any future activities can be built on solid experience. Another strong point is that LBE isn't satisfied to coast on its past performance. Under the direction of A. V. Lowe, new LBE program manager, plans are in the mill to get recent consumer reaction to Live Better Electrically and flameless, and toward new program ideas. The findings will set the goals for future campaigns.

While this research is going on, LBE is studying many ideas that have come in from member utilities. One suggestion is to expand the program to include more promotional services such as display ideas, news stories, and pictures for use in sponsoring companies' publications and promotions. Several suggestions have called for coordinating promotions by NEMA, and large electrical manufacturing companies, with LBE appliance promotions. In other words, when LBE is promoting ranges, then the manufacturers should be promoting ranges at the same time.

But the most frequent suggestion that LBE people hear is, "Let's get into television." Member companies envision the Live Better Electrically message carried on prime evening time. And no one doubts for a second that TV coverage would be effective. But at present, the budget that LBE works with doesn't allow the effective use of two major national media. To employ TV and magazine coverage together under present circumstances, LBE people say, "would be to dilute the schedules in both to a point of questionable value." They'd rather try to do a good job in one medium than an ordinary job in several media.

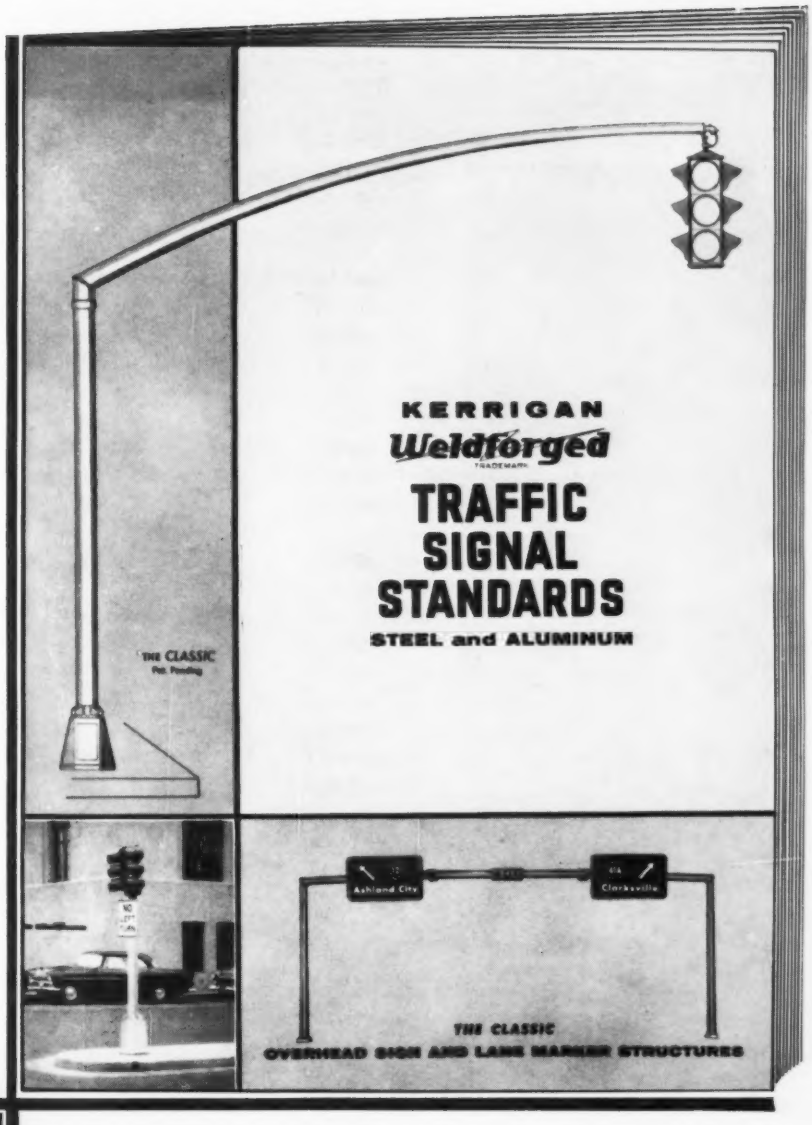
Television may come in sometime in the future. "Believe me," said one LBE official at a recent EEI sales conference, "television is not a forgotten subject, nor one that we have discarded." Live Better Electrically estimates, "We would have to have $1 million more than we now have, and it would mean the sacrifice of the present strong magazine campaign."

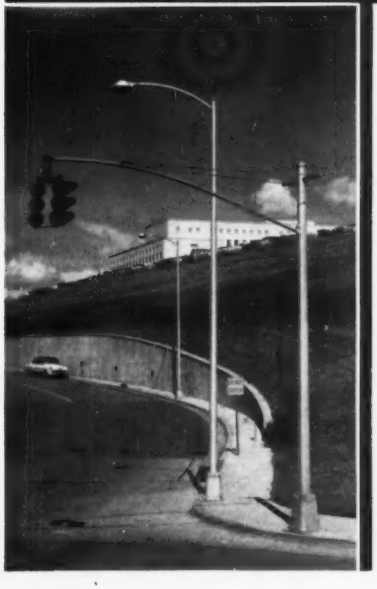
Television, expanded magazine coverage, and many other campaign ideas may well be in LBE's future. Judging from the way the present campaign has been received, LBE has a good deal of punch, and most member utilities want to see that effectiveness used for more and more coverage. But simple arithmetic makes it obvious that the program has limitations. It can't get any bigger or better than the electric industry makes it. It won't grow unless the industry, after weighing its past performance, decides that it's worth even more money and effort. And this is a question that only the industry can answer.

NEW CATALOG

modern streamlined

TRAFFIC SIGNAL STRUCTURES





Kerrigan's new CLASSIC design combines strength and installation ease with beauty and grace to enhance the most modern street or highway project . . . with matching structures for lighting, traffic signals and signs.

Get YOUR copy of the new catalog pictured here! Choose from the *latest* in traffic signal and sign supports!

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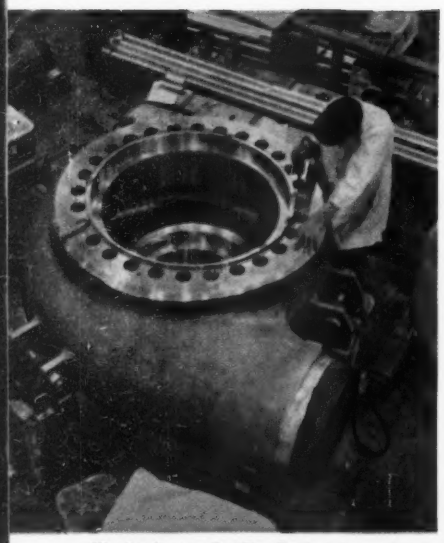
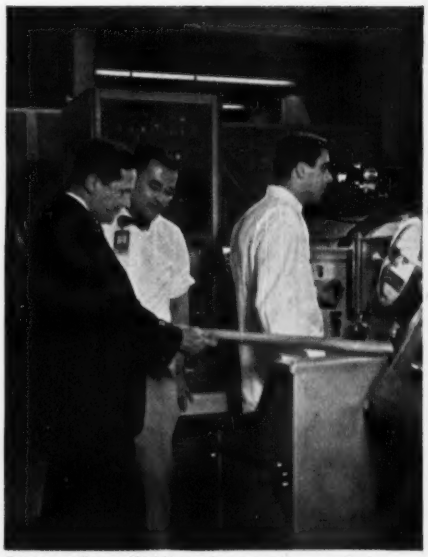
STREET AND AREA LIGHTING STANDARDS IN STEEL AND ALUMINUM

Thousands of Westinghouse people work full time on commercial atomic power

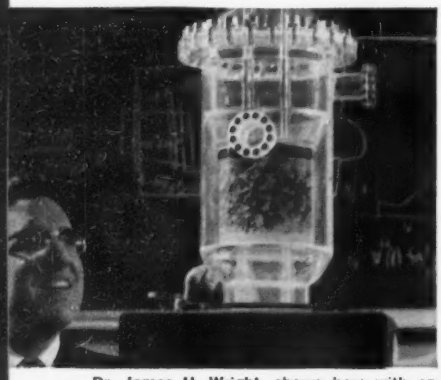
People, facilities and successful experience . . . these are reasons why Westinghouse is the world's leading supplier of nuclear power plants and components.



Westinghouse Quality Control inspector is working on a nine ton stainless steel pump casing at the Atomic Equipment Department in Cheswick, Pa. Department produces canned motor pumps, valves and control rod mechanisms.

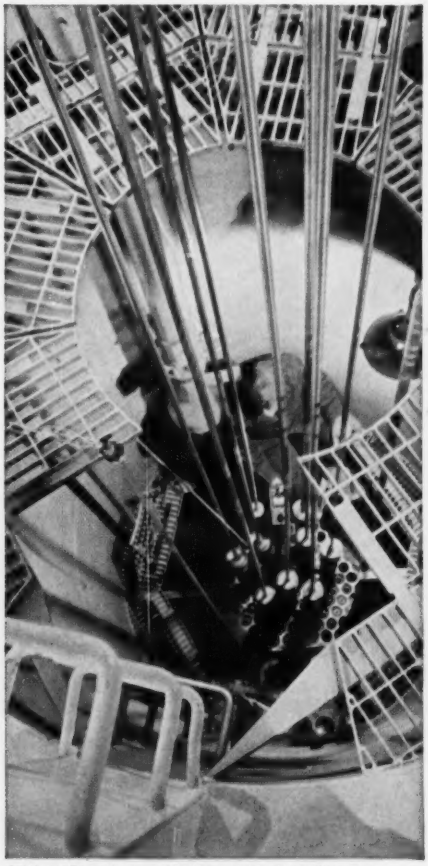


Electron Beam Welding of core components is one of the many special skills employed at the Atomic Fuel Department, Cheswick, Pa. Standard products of the department are reactor cores and their components.



Dr. James H. Wright, shown here with an organic moderated fluidized bed reactor model, is also doing important development work on the concept of an integral boiling and superheat reactor (IBSHR).

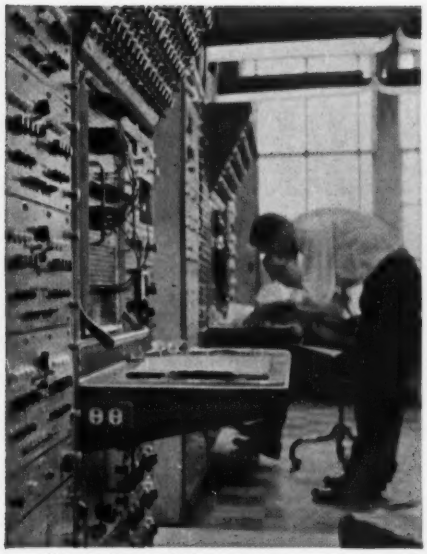
Westinghouse Engineers, after design, follow through on construction of reactor plants such as this 5,000 kilowatt plant being built at Saxton, Pa., for the Saxton Experimental Corporation. This new reactor will be used with an existing turbine generator at the Pennsylvania Electric Company site.



Critical Experiment Station at Testing Reactor. This technician is working in the low power test facility used to confirm physics calculations by experiments before exposure in the reactor.

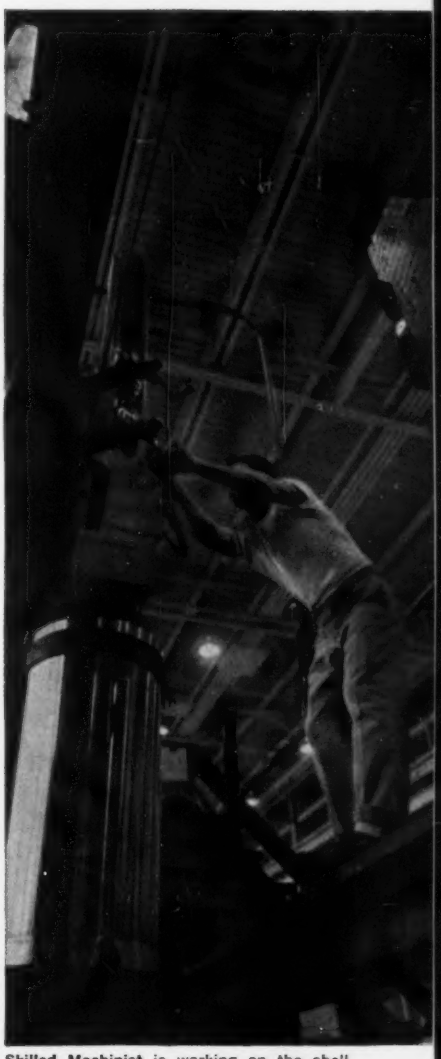
Westinghouse Testing Reactor facility includes hot cells and metallographic cells for post-irradiation examination of samples. Nuclear fuels and other materials can be tested inside cylindrical fuel elements of reactor core. Chemical, analytical and counting laboratories are used for post-irradiation tests.

J1-59503



Westinghouse Mathematicians are working out the solution to a nuclear fuel problem at this computer installation in the Atomic Power Department at Forest Hills, Pa.

Dr. W. E. Shoupp, Technical Director of the Atomic Power Department, plays vital role in developing atomic fueled plants to the point where they will be economically competitive with fossil fueled plants in the generation of electric power.



Skilled Machinist is working on the shell and flange for a canned motor pump on a 120" vertical boring mill at the Atomic Equipment Department.

Dr. Joseph C. Danko heads up promising advanced research of the thermoelectric reactor, a potential means of generating electricity directly from fission heat without a turbine-generator unit.

Fuel Assembly Operation at the Atomic Power Department, where facilities are maintained for development of advanced fuel concepts. Technician is working on cage of a fuel assembly.

Dr. Sidney Krasik, Technical Director of Astronuclear Laboratory, works on applications of atomic power in outer space, such as nuclear power propulsion, the nuclear ram jet and auxiliary power plants for space vehicles.

You can be sure . . . if it's

Westinghouse

Westinghouse Electric Corporation
Box 868, Pittsburgh 30, Pa.

When dependability is of vital nature ...a natural selection is proven-quality

The consistent selection of Paranite by Power Users in all parts of the country is significant of its dependability. Producing reliable, high-quality power cable has been a Paranite specialty for 71 years... from 600 volt network through 28,000 volt power cable. You can depend upon it... "If it's Paranite, it's right.®"

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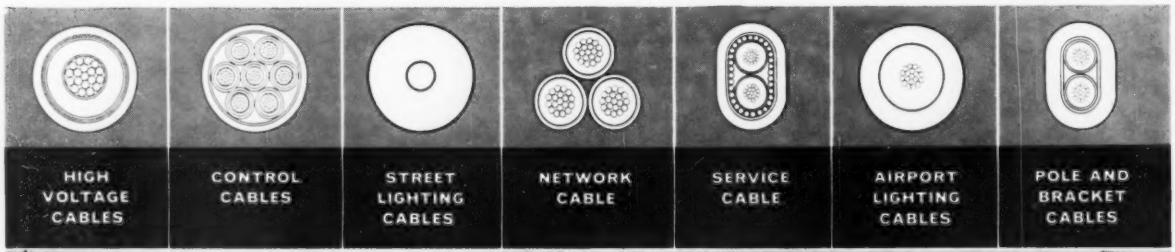
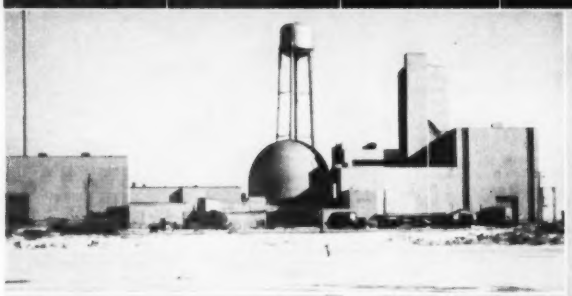


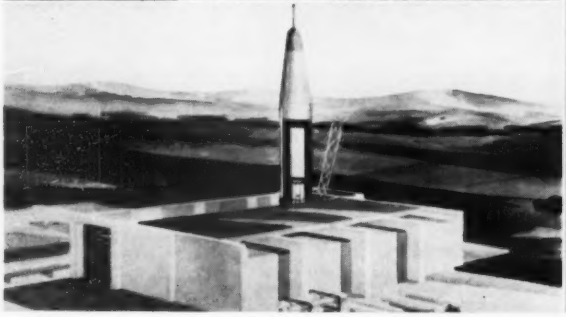


The Enrico Fermi Atomic Power Plant

near Monroe, Michigan, operated by the Power Reactor Development Company and the Detroit Edison Company. Paranite was selected to supply 600 V. network and 5,000 V. shielded cable for the nuclear section. Illustrated at right is a typical Paranite Power Cable.

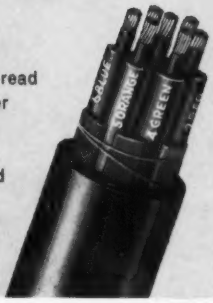
Indian River Generator Plant

of the Orlando, Florida, Utilities Commission. From transmission line... to power cable ...through control cable... Paranite was specified to carry the load in serving this growing area. Illustrated at right is one of Paranite's complete line of 600 V. Network Cable.



Missile Bases

provide another example of the widespread and diversified use of Paranite in power distribution throughout the nation. Paranite Control Cables are produced in a complete range of insulation and jacket types. Illustrated at right is a typical Paranite Control Cable.



For more information on high voltage, control, street lighting, network, service and airport cables contact your local Paranite representative... or write Paranite Wire and Cable Division, Dept. 204, 2601 S. Adams St., Marion, Indiana.

Since 1890

PARANITE WIRE & CABLE DIVISION

ESSEX WIRE CORPORATION, Marion, Indiana

MANUFACTURING PLANTS: Marion, Ind.; Jonesboro, Ind.; Tiffin, Ohio; Anaheim, Calif.

Sales Offices and Redistribution Warehouses in all Principal Cities

Selling

Canadian Installation Raised 16,500 Lumens

Photo courtesy of Powerlite Devices Ltd Co

In 1959, repair work on the main business thoroughfare street lighting installation in St. Catharines, Ontario, became necessary. But repair cost estimates were higher than anticipated, so consideration was given to a new relighting installation which would modernize the street and help the merchants offset loss of business threatened by a large shopping center being built just out of town.

At the official relighting ceremony last year citizens saw this scene: Gone were the steel standards, the incandescent luminaires, and the overhead wiring. Instead of previous 8,500 lumens, each new 400-w, integral-ballast, mercury-vapor luminaire gave 25,000 lumens. Concrete poles with tapered aluminum davit brackets had replaced the steel standards. The davit extenders were fitted with festoon wiring outlets for additional seasonal lighting, such as Christmas decorations. The steel standards were sold as scrap, thus helping reduce the cost of the new installation.

Luminaires are mounted at 36 ft 6 in. on opposite spacings, and provide an average of 2.65 footcandles.

Accompanying changes were made underfoot. Supply wiring was laid 8 in. under the sidewalk in Transite ducts with a 10-in. junction box at the base of each pole. With this new wiring were also laid cables for traffic controls, fire alarm boxes and for the new pedestrian traffic lights.

While the underground wiring was being done, simultaneous work was carried out with gas line installations, waterworks' improvements and sidewalk repairs.

The local police report no attempts to break into any of the shops protected by the new lighting. The Downtown Retail Merchants Assn considers it has enabled them to retain business in spite of the competition from out-of-town shopping centers.

Street Lighting Gets New Twists in Florida

Street lighting has been given a couple of new twists by two Tampa, Fla., builders.

In the Campus Park development, adjacent to the University of South Florida campus northeast of Tampa, all easements are at the rear of the homes. Therefore, poles are not available on the streets for street lighting. To solve this problem the developers are installing yard lights in front of each house in the development, in order to provide street or pedestrian lighting. Photoelectric cells are being installed to turn lights on and off automatically.

Tampa Electric Co feels that this is an ideal solution to the age-old problem of street lighting. It eliminates the problems of forming street light tax districts, signing contracts and other problems. Also, the yard lights at each home will provide additional residential revenue in this total-electric area.

Town 'n Country Park, which has plans for a 3,500-home development west of Tampa, has signed contracts with Tampa Electric Co for complete modern street lighting throughout the entire development, in contrast to main thoroughfare street lighting normally provided developers in projects of this type.

YARD LIGHTS substituted for street lighting in new home development

News About People

South Carolina E&G Boosts Three

McMEEKIN WILLIAMS DIBBLE

F. R. McMeekin has been boosted to vice president and general manager of South Carolina Electric & Gas Co, Arthur M. Williams Jr to senior vice president, and George L. Dibble to vice president-electric operations and engineering.

McMeekin has been vice president in charge of operations since 1952.

Williams will continue as staff counsel and will supervise public relations. Dibble has been with the company since 1946.

Kreamer Elected Houston L&P Vice President-Operations

KREAMER ▶

Karl K. Kreamer has been elected vice president in charge of operations of Houston Lighting & Power Co.

He will supervise generating operations, construction and maintenance of transmission and distribution facilities, and operations of the engineering, dispatching, and transportation departments.

With the company since 1935, Kreamer served as its representative in Washington, D. C. during World War II and the Korean War. He was named assistant to the vice president in charge of operations in 1956.

Powers Becomes H.K. Porter Co VP

Shannon C. Powers has stepped into the post of vice president and general manager of the National Electric division of H. K. Porter Co, Inc.

General manager of the division since last year, Powers was previously general manager of Peerless Electric division. He had been vice president and general manager of Peerless Electric Co when it was bought by Porter.

◀ POWERS

McDONALD ▶

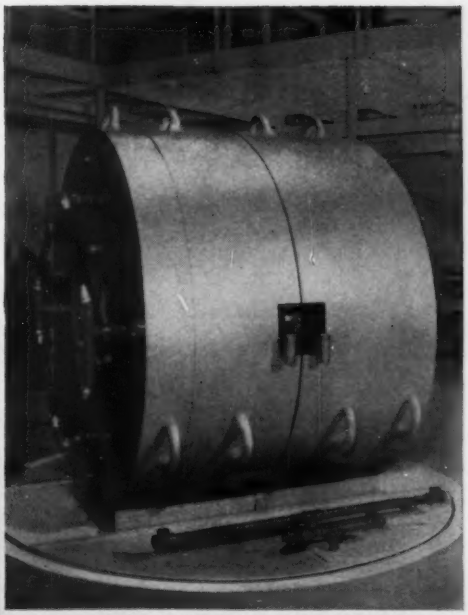
Square D Promotes McDonald to VP

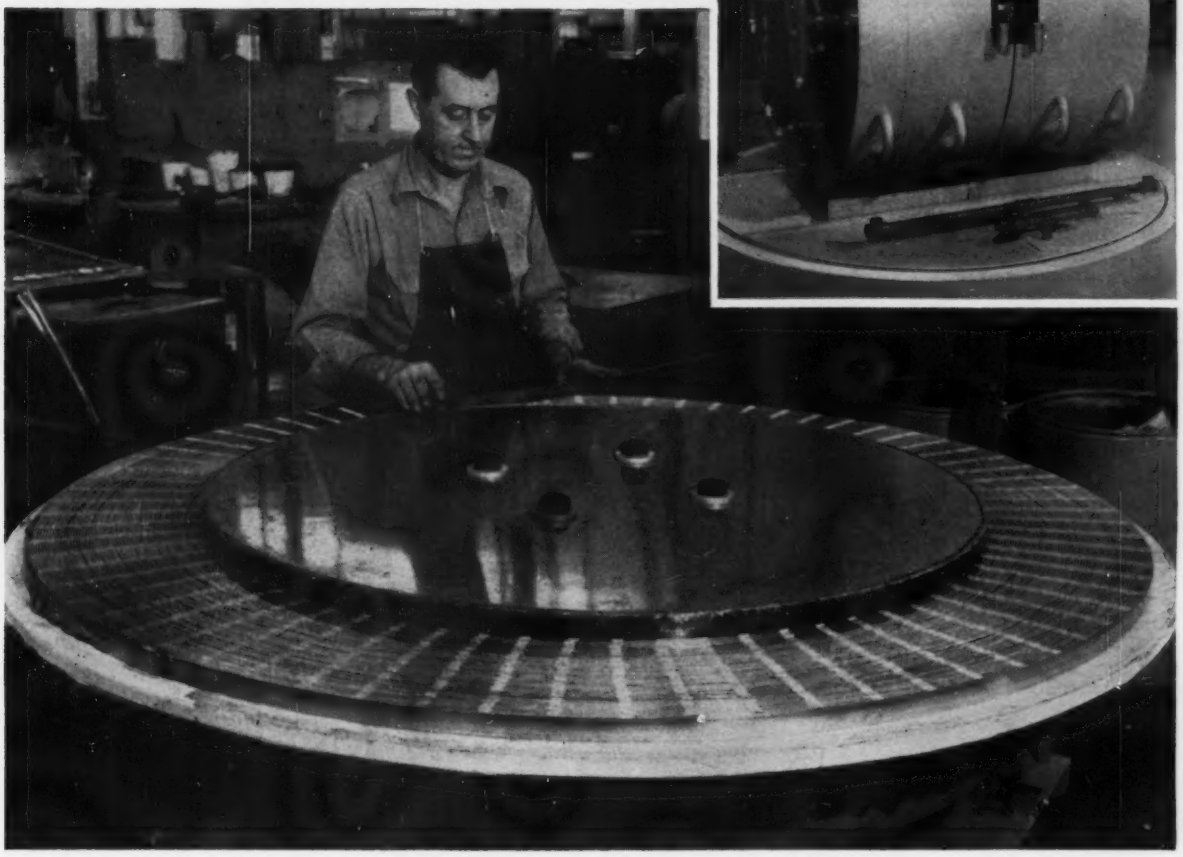
Square D Co has promoted Grant McDonald to a vice presidency. He is manager of the company's distribution equipment division at Lexington, Ky.

McDonald joined Square D in 1929 and became Detroit plant superintendent 11 years later. He was boosted to manufacturing manager in 1955. McDonald has held his division manager post since 1959.

(*More News About People on page* 117)

National builds magnet coils for Ohio State's low temperature research





The magnet in which these National coils are used works with a cryostat to develop temperatures approaching –460° F. The Ohio State University will employ the equipment to study the behavior of solid materials in the temperature range between 1/100 and 1 degree above absolute zero.

With a liquid refrigerant, the lowest temperature that can be reached is 0.4° absolute. With electromagnetic cooling, researchers will be able to attain temperatures as low as 0.01° absolute, opening up new fields of scientific knowledge.

Your regular and special needs for high quality electromagnetic components can be taken care of by National. For more information, call our Columbus plant . . . HUdson 8-1151...or the nearest National field engineer.

NATIONAL COILS

National Electric Coil

COLUMBUS 16, OHIO • IN CANADA: ST. JOHNS, QUEBEC

DIVISION OF McGRAW-EDISON

Brush control

Arbor specialists

Right-of-way clearance

Tree surveys

Line clearance

Experimental research

Tree trimming

Technical consultation

Scientific application through research and experience

More than 13 years ago Bartlett successfully pioneered the use of the helicopter for shade tree spraying—an operation that was to lead the way, a few years later, to a new efficient method of control of woody plants along utility rights-of-way.

At first, difficult terrains presented unusual problems but gradually through research and experience, new equipment was developed and new herbicides and techniques perfected to overcome them. Today, Bartlett research in this important field is carried on continuously through college fellowships and at the Bartlett Research Laboratories.

If your right-of-way clearance, line trimming, brush control or tree survey requirements present a problem, we invite you to share our years of experience. This service is now available from Maine to Florida, and west to Illinois and Alabama.

BARTLETT TREE EXPERTS

Home Office, 2770 Summer Street, Stamford, Conn.
Research Laboratories and Experimental Grounds, Stamford, Conn.

Bailey Meter Appoints Executive VP, Two Vice Presidents

Bailey Meter Co has appointed H. H. Gorrie executive vice president; L. F. Richardson, vice president sales, and J. H. Dennis vice president in charge of manufacturing and plants.

Gorrie has been with Bailey since 1927. He assumed posts of increasing responsibility and became a vice president in 1955. He was elected a director in 1957.

Richardson joined Bailey in 1930 and has been district operations sales manager since 1957. With Bailey since 1937, Dennis became manufacturing manager last year.

GORRIE RICHARDSON DENNIS

KIRKBY ▶

Kirkby G&W Electric Specialty VP

Norman O. Kirkby has become vice president and general manager of G&W Electric Specialty Co.

Kirkby joined G&W in 1957 as manager of engineering. He became general manager two years ago. Before coming to G&W, Kirkby was assistant to the president of Wade Electric Products Co and, prior to that, director of research and executive engineer of Vaper Heating Corp.

Stone & Webster Engineering Names Three Vice Presidents

Stone & Webster Engineering Corp has promoted C. G. Davis, T. A. Fearnside, and F. R. Stevens to vice presidents.

Davis, a construction manager, has been with Stone & Webster since 1937. Fearnside joined Stone & Webster in 1940. He was subsequently chief mechanical engineer, assistant engineering manager, and, since last year, engineering manager. Stevens, who has been labor relations consultant since 1959 and personnel manager since 1953, joined Stone & Webster ten years ago.

DAVIS FEARNSIDE STEVENS

Utility Appoints Brewer Electric Department Head

R. F. Brewer has been promoted to general manager-electric department at Iowa Southern Utilities Co. He will supervise electric engineering functions in addition to his present responsibilities as supervisor of electric operations.

Brewer joined Iowa Southern in 1954 as general engineer. He was subsequently superintendent of production and operations, manager of production and operations, and manager-electric operations.

Succeeds Holum at MECA

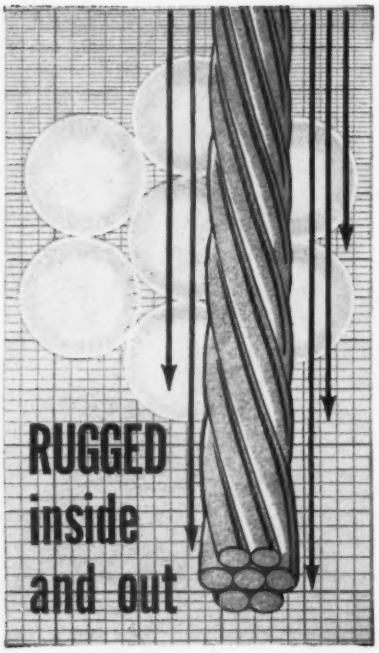
Harold R. Lee, power supervisor for Region 7 of the Bureau of Reclamation, has been elected executive director of Midwest Electric Consumers Assn, and will establish its headquarters in Denver.

He succeeds Ken Holum, recently appointed assistant secretary of the Interior Department, who had offices in Aberdeen, S. D.

Utility Researcher Heads Newly Organized Firm

The firm of Reaves, Hewitt & Co, Inc, has been organized in New York. It will specialize in investment banking, advisory and brokerage services. Major emphasis will be on investment research, particularly on public utility securities and smaller growth companies.

William H. Reaves, formerly head of the public utility research department of Kidder, Peabody & Co, will be president; Charles E. Hewitt, vice president and treasurer; John A. Dua, vice president; and John F. Jahoda, an associate.



Crapo
GALVANIZED
STEEL STRAND

Ruggedness and reliability are built into **Crapo** Galvanized Steel Strand from start to finish. The selected steel is carefully processed to make the final product strong and ductile —easy to handle, work and serve. The time-proved, tightly-bonded, tough zinc coatings resist the abuse encountered in construction and provide lasting protection against corrosion.

Crapo Galvanized Steel Strand is economical, too, both in first cost and ultimate cost.

CHOOSE FROM 3 COATING WEIGHTS

A coating weight for every need—**Crapo** Galvanized Steel Strand is readily available in Class A, B and C weights of coating. Class B coating is twice as heavy as the standard Class A coating; Class C coating is three times as heavy.

Contact the distributor of **Crapo** Galvanized Steel Strand near you for complete information!

INDIANA
Steel & Wire Co., Inc.
Muncie, Indiana

Create Dual Image, Jones Tells PUAA

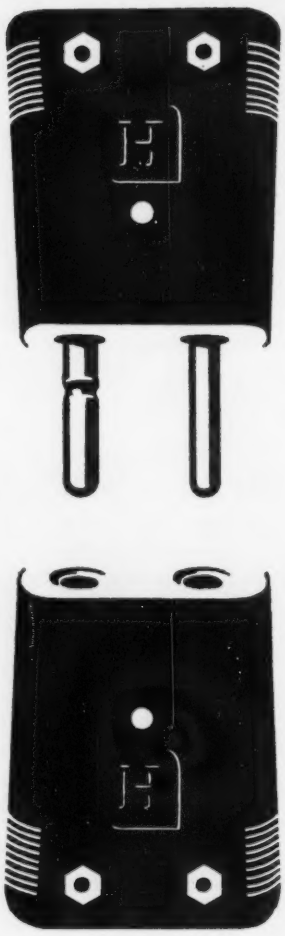
Soul searching by utility ad-men, the presentation of copy awards, and a bright economic forecast were the high points of the Public Utilities Advertising Assn (PUAA) convention held in Detroit this month.

The soul searching began when the 256 registrants heard comments by Ernest A. Jones, president of MacManus, John and Adams, Inc, on "How Utile Is Utility Advertising?" Stressing two points, Jones chided: "More people should be alerted to public-owned utilities in order to disprove the monopoly idea many customers now have. Today's advertising dollar," he continued, "cannot be restricted to pronounce one thing. We must have what we call 'dual dollar' advertising to establish more than one image in the consumer's mind. Finally," said Jones, "prepare for tomorrow by what you do today."

"The Care and Feeding of Creativity" was exposed by Thomas B. Adams, president of Campbell-Ewald Co. Adams' comments included the importance of individual creative ability plus its proper guidance and placement. "To be correctly developed," Adams explained, "creativity needs time and outside experience more than other elements. An individual must divorce himself from togetherness; this can only be achieved through analysis, evaluation and application."

Edwin O. George, vice president of the Detroit Edison Co, delivered a talk on ethics in advertising. He questioned the honesty of some campaigns claiming an all new approach to appliances, heating methods, etc, reminding the utility industry of partial obsolescence in some existing appliances. By contrast the Medallion Home and Blue Flame campaigns were exemplified as honest advertising. "We need new marketing concepts," George revealed. "There must not be any unfair competition among ourselves, and we need bold thinking to give a better way of life to our customers."

A cautious note was offered when William M. Longman, president of Central Surveys, Inc, delivered a well-received speech on "The Trends in Government Ownership."



QuiK-Konnect
PLUGS AND JACKS

New Honeywell QuiK-Konnect Plug and Jack Assemblies provide fast, foolproof connection of thermocouples to extension wire, and thermocouple extension wire to instruments. Inserts of different diameter positive and negative poles insure correct polarity every time. Inserts are easily removed for field calibration change or replacement, and can be furnished in different metals to match thermocouple alloy. Honeywell Quik-Konnect Accessories include identos, cable clamps, and tube adapters.

Get complete details from your nearby Honeywell field engineer, or write today for Specification Sheet FS 005-3. Minneapolis-Honeywell, Wayne and Windrim Avenues, Philadelphia 44, Pa. In Canada, Honeywell Controls, Ltd., Toronto 17, Ontario.

Honeywell
First in Control
SINCE 1885

The growing concern of expanding government-owned utilities was graphically relayed by charts. "Prevention," Longman advised, "is one way to avoid the expense and danger inherent in having municipal ownership elections crop up around your territory. Prevention means good public relations — establish and maintain good customer acceptance of the cost of service—produce good advertising backed up by well-informed employees."

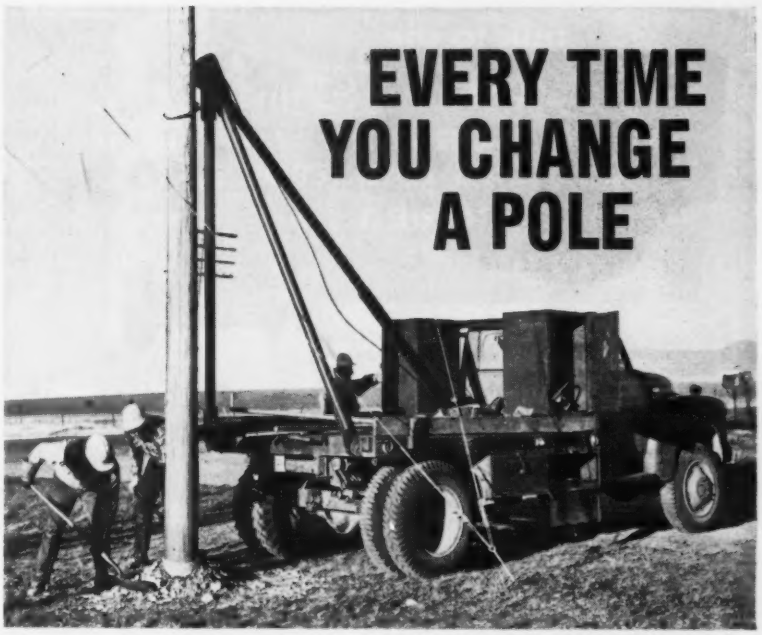
Great emphasis was placed on proper communication with customers because some of the language currently being used is not effective. "Public power," "private power," "public ownership," and "private enterprise" are examples. Since these terms communicate so poorly, their use should be avoided unless there is full opportunity to explain their true meaning. "Federalized," said Longman, "is the best word to use when referring to federal government power systems, and 'government-owned' is the recommended term for municipal or state systems."

A speech by Albert V. Lowe, the Live Better Electrically program manager of the Edison Electric Institute, preceded the convention activities. Lowe reviewed LBE's 1961 plans. "National magazines," he said, "will carry the 'Live Better Electrically' ads because they best fulfill the basic elements of size, concentration, and continuity."

'Total Electric,' 'Flameless' Assets

The coining of "Total Electric" by Westinghouse Electric Corp, and "Flameless," partially supported by General Electric Co, were cited as assets in the LBE programming. "A total of more than $53 million will be spent in LBE themes during 1961," Lowe explained. "Manufacturers will invest over $20 million, utilities will add $32 million in local efforts, plus $2.5 million from Edison Electric Institute."

Out of 2,500 entries, 168 PUAA better copy awards were presented by William L. Perdue, director of publicity for the Kansas Power & Light Co. The entries were divided into three categories according to size of the utility: less than 150,000 customers; more than 150,000 and less then 400,000; and more than 400,000. The contest included newspaper ads, magazines, em-

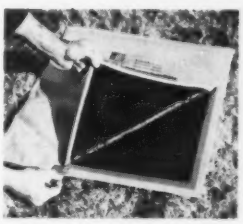


Protect it with a POL-NU® PAK

When a pole is removed from one location and re-set in new earth it is subject to rapid decay and insect attack at the critical ground-line area. Renewal of preservative protection is vital to obtain longest possible service life.

The Chapman Pol-Nu Pak makes it easy for line crews to apply ground-line preservative to "road-moves" and poles being returned to service. It is an envelope-type bandage containing Chapman Pol-Nu, grease-type preservative which gives long-lasting protection.

Pol-Nu Paks are available in several sizes and, because of their convenience, are often preferred for down-the-line treatment of standing poles. Factory sealing of the Pak always insures the proper amount of preservative application for maximum protection without waste. The photos below show how easily it is applied. Mail coupon for data.


Slit Pol-Nu Pak on three sides to expose preservative.

Wrap bandage around pole at ground-line and staple.

Back-filling completes job, assuring longer pole life.

CHAPMAN CHEMICAL COMPANY
Leading manufacturer of wood preservatives • Memphis 1, Tenn.

CHAPMAN®
POL-NU
PAK

MAIL COUPON FOR COMPLETE DATA
Chapman Chemical Company
P. O. Box 138, Memphis 1, Tenn.

Please send data on the Pol-Nu Pak to:

Name _____

Company _____

Address _____

_____

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SPECIALISTS in...
• TRANSFORMER COOLING RADIATORS
• ACCESSORIES
• TANKS

Shaw-Perkins Transformer Cooling Radiators, design standard for the transformer industry, give you the *full* economy and dependability of thermo-siphon self-cooling. Sizes and models for any make or capacity of transformer, either rebuilt or new. MAX/FLO oval tubes assure optimum heat dissipating surface, free flow characteristics. Complete range of flanges, elbows, valves, and other accessories are available for all mounting conditions.

Transformer tanks, another product of Shaw-Perkins specialized engineering, are built to customer specification, in sizes from pole line distribution types to power transformers up to 3750 KVA.

Write today for information and new catalog on transformer radiator and tank accessories.

Write today for full information
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201 East Carson St. • Pittsburgh 19, Pa.

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to 52 issues of Electrical World—delivered each week to my home. You can bill me later for $6...

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H-3

aren't you really above routing slips?

In all fairness to yourself and your job responsibilities, don't you deserve your own personal copy of Electrical World? Your name, title and residence address on your letterhead will bring you 52 issues of Electrical World. Make a better impression, more job headway. The cost—only $6. No need to send money now.

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MULTIPLEX SPREADER CO.
P.O. Box 163, Gresham, Oregon
Manufacturer of the Only Practical Spacer for Midspan Connection on Spun or Reverse-Lay Secondary Cable

SAFE, ECONOMICAL, SIMPLE INSTALLATION
NEW PRICE LIST
BY REQUEST

ployee newspapers, direct mail, displays, publications, posters, annual reports, billboards, radio and television, and motion pictures. Three outstanding companies won five awards each: Commonwealth Edison Co, Northern States Power Co, and Pacific Gas & Electric Co.

Repeated comments by conventioneers left no doubt that the outstanding contributor during the two-day session was Dexter Keezer, economic advisor for McGraw-Hill Publishing Co. Keezer's speech, "Are the 60's Going to Get Soaring?" created much enthusiasm.

"This decade," he said, "will increase its population by 34 million, or 19%. This intensifies the need for greater growth and production. Over $13 billion will be spent this year for research and development, and it will increase to $24 billion by 1970. The output per manhour will increase 2¾% by 1970. The average family income will rise from $6,255 in 1960 to $7,850 in 1970."

New Officers Elected

New officers elected during the PUAA convention were John A. Fleming, president; James W. Lumpp, first vice president; Elton E. Stuenckel, second vice president; William L. Perdue, third vice president; Donald T. Spangenberg, secretary; and Mead Schenck, treasurer.

New York Will Be Site Of EEI Annual Meeting

The Edison Electric Institute will hold its 29th annual convention in New York June 5-7, with a program built around the theme of "Targets for Tomorrow in Electric Power." General Sessions will be held in the Waldorf-Astoria Hotel.

Delegates will hear estimates of the future of electric energy presented by authorities both within and without the industry. Scheduled speakers include EEI President Sherman Knapp; Dr Emerson Schmidt, Economic Research Director, Chamber of Commerce of the US; Philip Sporn, American Electric Power Co; J. K. Horton, Southern California Edison Co; Ralph M. Besse, Cleveland Electric Illuminating Co; Ernest Acker, Central Hudson Gas & Electric Corp; and Edwin Vennard, EEI.

Before you buy MICROWAVE...see RCA

Find out for yourself why RCA Microwave systems are now providing more than a million channel miles . . . see how a system can be supplied to fill all your communications needs, can be engineered to meet your data handling and automation requirements of today and tomorrow.

TODAY, time-tested RCA Microwave is being extensively used in the petroleum industry, by electric utilities, turnpikes, municipalities and telephone companies for telemetering, facsimile, data processing, voice transmission and supervisory control.

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Meetings Calendar

JUNE

Oregon Washington & Idaho Tri-State Cooperative Meeting—Shore Lodge, McCall, Idaho, June 1-3.

ECAP—Management Group, Hotel Pierre, N. Y. C., June 4.

Electric Companies Public Information Program—Steering Committee Meeting, Teakwood Room, The Pierre, New York City, June 4.

Edison Electric Institute—Annual Convention, Waldorf Astoria, New York City, June 5-7.

Instrument Society of America—Summer Instrument-Automation Conference and Exhibit, Royal York Hotel & Queen Elizabeth Hall, Toronto, Ontario, Canada, June 6-8; Air Pollution Instrumentation Symposium (with the June 11-15 Annual Meeting of the Air Pollution Control Association), Hotel Commodore, New York City, June 12.

Pennsylvania Electric Association—Joint Meeting of Stores Committee & Purchasing Committee, Connellsville, Pa., June 8-9; Personnel Practices, Hershey, Pa., June 22-23; General & Customer Accounting Committee, Bedford Springs Hotel, Bedford, Pa., June 22-23; Customer Contact Committee, Erie, Pa., June 23; Industrial Committee, Penn State, Pa., June 23; Taxation Committee, Pittsburgh, June 26-27; Plant Accounting & Records Committee, Allenbury, Pa., June 29-30.

Wisconsin Utilities Association—Accounting Conference, Dell View Hotel, Lake Delton, Wisconsin, June 11-13.

Wisconsin Municipal Utilities Association—Annual Conference, Imhoff's Lake Delton, June 11-13.

American Society of Mechanical Engineers—Semi-Annual Meeting, Statler Hilton Hotel, Los Angeles, June 11-14.

• **Institute of Radio Engineers**—Third National Symposium on Radio Frequency Interference, Sheraton Park Hotel, Washington, D. C., June 12-13.

• **Electric Council of New England**—Commercial-Industrial-Area Development Workshop, Equinox House, Manchester, Vermont, June 12-14.

• **Northwest Public Power Association**—Engineering and Operations Section, Annual Workshop, Marion Hotel, Salem, Oregon, June 15-16.

• **American Institute of Electrical Engineers**—Summer General Meeting, Ithaca, June 18-23.

• **Mountain-Pacific Conference of Public Utilities Commissioners**—Princess Kaiulani Hotel, Honolulu, Hawaii, June 18-24.

• **Michigan Gas & Electric Association**—Mackinac Island, June 19-21.

• **American Standards Association**—Industrial Standardization Seminar, Engineering Societies Building, New York City, June 19-23.

• **American Society For Testing Materials**—Annual Meeting, Chalfonte-Haddon Hall Hotel, Atlantic City, June 25-30.

• **Canadian Electrical Association**—71st Annual Meeting, Banff Springs Hotel, Banff, Alta., June 26-28.

• **Joint Automatic Control Conference**—Sponsored by AICE-AIEE-ASME-IRE-ISA, University of Colorado, Boulder, June 28-20.

JULY

• **National Society of Professional Engineers**—27th Annual Meeting, Olympic Hotel, Seattle, Washington, July 4-7.

• **Conference on Electrical Techniques in Medicine and Biology (combined with International Conference on Medical Electronics)**—Sponsored by AIEE-IFME-IRE-ISA, Waldorf Astoria Hotel, New York, July 16-21.

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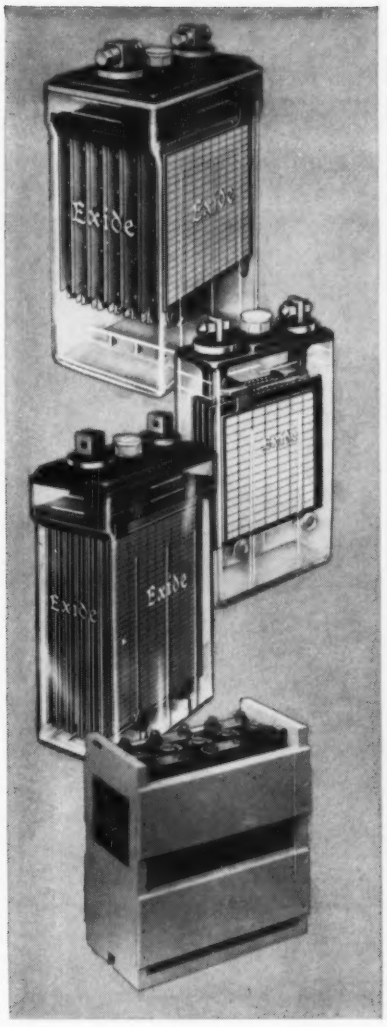

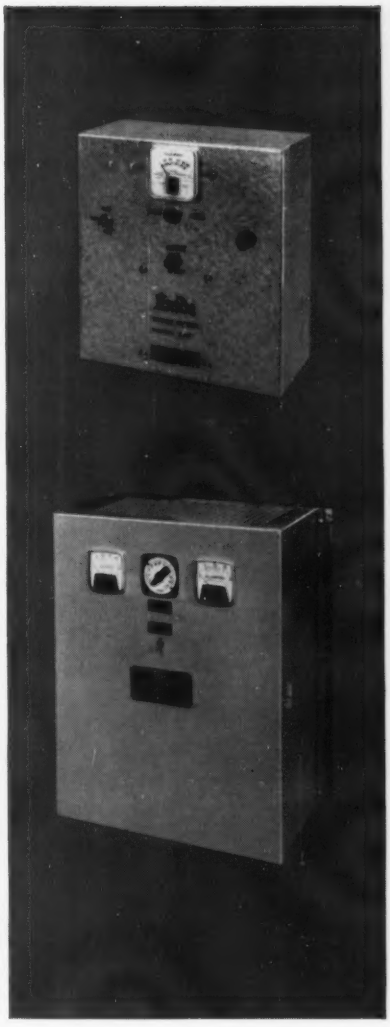

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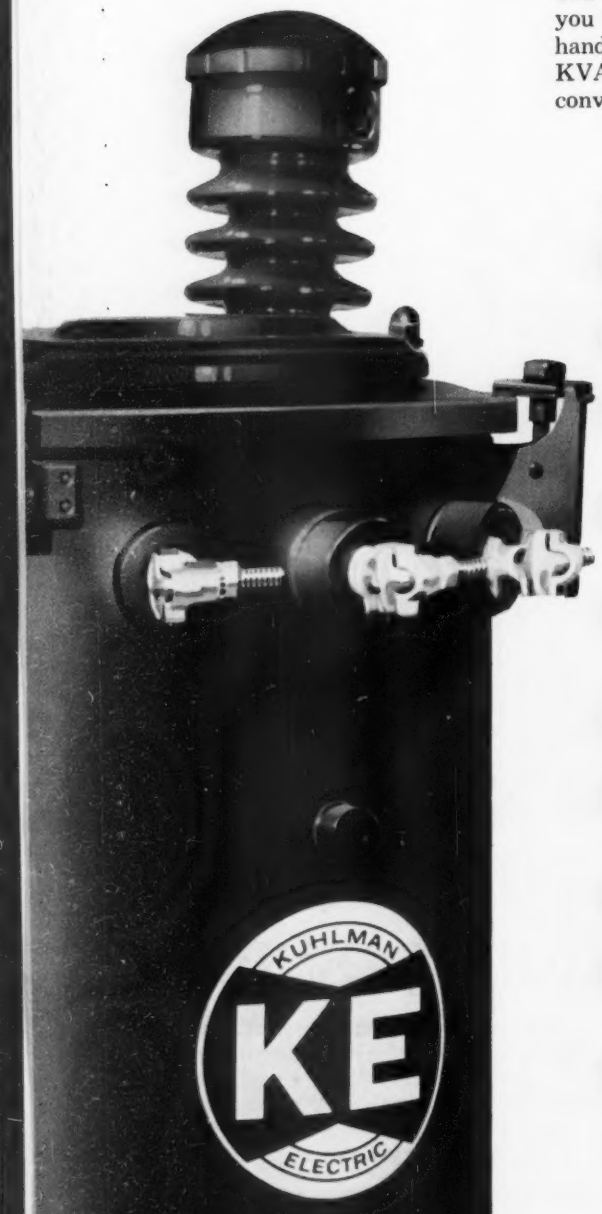

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